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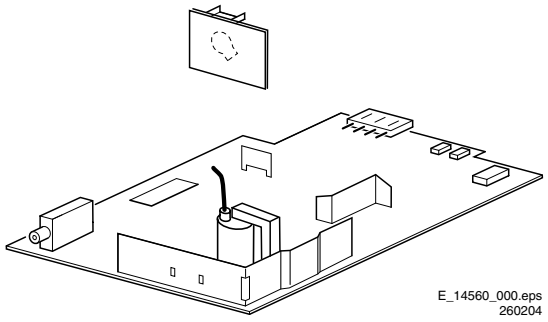

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Service Manual

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PHILIPS

1. Technical Specifications, Connections, and Chassis Overview

1.1 Technical Specifications

1.1.1 Reception

Tuning system	:	PLL
Colour systems	:	NTSC M
Sound systems	:	Mono, or
	:	BTSC with SAP
A/V connections	:	NTSC M
Channel selections	:	181 Presets/ Channels
	:	Full-Cable
IF frequency	:	45.75 MHz
Aerial input	:	75 ohm (F type), Coax

1.1.2 Miscellaneous

Audio output	:	Mono: 1 W rms
	:	Stereo: 2 x 1 W rms
Mains voltage	:	105 - 132 V (± 10 %)
Mains frequency	:	50 / 60 Hz (± 5 %)
Ambient temperature	:	+ 5 to + 45 deg. C
Minimum air pressure	:	60 kPa (=600 mBar)
Maximum humidity	:	90 %
Power consumption	:	36 W (13") to
	:	50 W (20")
Standby Power consumption	:	< 3 W

1.2 Connections

1.2.1 Front Connections

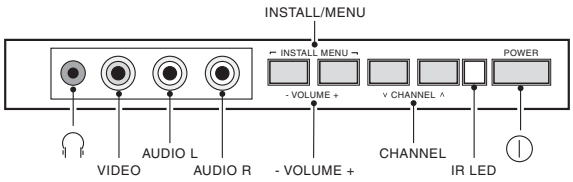


Figure 1-1 Front Connections

Headphone

Bk - Headphone,
3.5 mm 8 - 600 Ω / 4 mW

Audio / Video In

Ye - Video	1 Vpp / 75 ohm	
Wh - Audio L	0.2 V rms / 10 kohm	
Rd - Audio R	0.2 V rms / 10 kohm	

1.2.2 Rear Connections

Figure 1-2 Rear Connections

FM Ant

1 - F type 75 ohm, coax

1.3 Chassis Overview

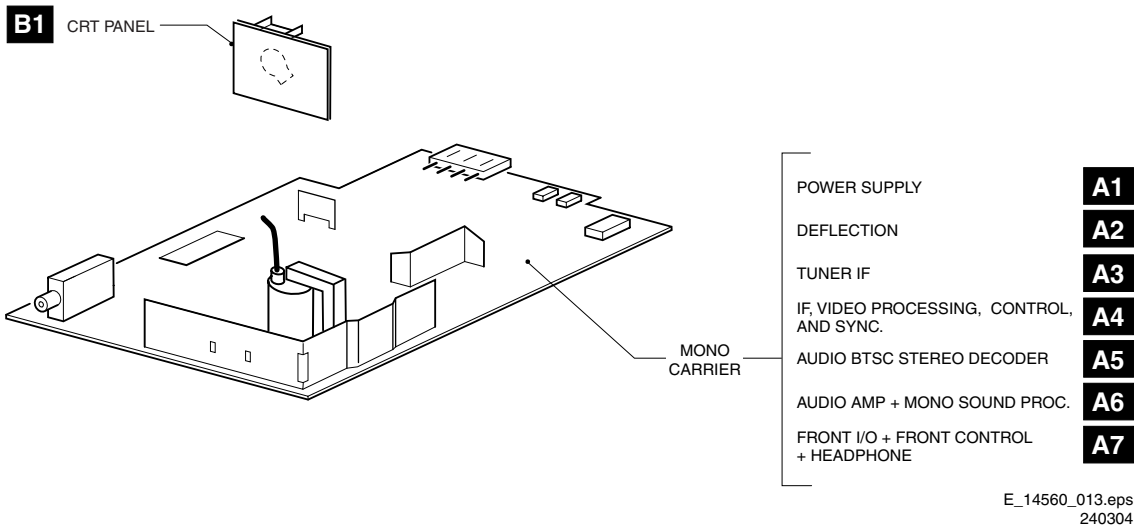


Figure 1-3 Chassis overview

2. Safety and Maintenance Instructions, Warnings, and Notes

Index of this chapter:
1. Safety Instructions for Repairs
2. Maintenance Instructions
3. Warnings
4. Notes

2.1 Safety Instructions for Repairs

Safety regulations require that during a repair:
- Due to the 'hot' parts of this chassis, the set must be connected to the AC power via an isolation transformer.
- Safety components, indicated by the symbol ⚠, should be replaced by components identical to the original ones.
- When replacing the CRT, safety goggles must be worn.

Safety regulations require that after a repair, the set must be returned in its original condition. Pay particular attention to the following points:
- General repair instruction: as a strict precaution, we advise you to resolder the solder connections through which the horizontal deflection current is flowing, in particular:
  – all pins of the line output transformer (LOT)
  – fly-back capacitor(s)
  – S-correction capacitor(s)
  – line output transistor
  – pins of the connector with wires to the deflection coil
  – other components through which the deflection current flows.

Note: This resoldering is advised to prevent bad connections due to metal fatigue in solder connections and is therefore only necessary for television sets more than two years old.
- Route the wire trees and EHT cable correctly and secure them with the mounted cable clamps.
- Check the insulation of the AC power cord for external damage.
- Check the strain relief of the AC power cord for proper function, to prevent the cord from touching the CRT, hot components, or heat sinks.
- Check the electrical DC resistance between the AC plug and the secondary side (only for sets that have an isolated power supply). Do this as follows:
  1. Unplug the AC power cord and connect a wire between the two pins of the AC plug.
  2. Turn on the main power switch (keep the AC power cord unplugged!).
  3. Measure the resistance value between the pins of the AC plug and the metal shielding of the tuner or the aerial connection of the set. The reading should be between 4.5 MOhm and 12 MOhm.
  4. Switch the TV 'off' and remove the wire between the two pins of the AC plug.
- Check the cabinet for defects, to prevent the possibility of the customer touching any internal parts.

2.2 Maintenance Instructions

It is recommended to have a maintenance inspection carried out by qualified service personnel. The interval depends on the usage conditions:
- When the set is used under normal circumstances, for example in a living room, the recommended interval is three to five years.
- When the set is used in an environment with higher dust, grease or moisture levels, for example in a kitchen, the recommended interval is one year.
- The maintenance inspection includes the following actions:
  1. Perform the 'general repair instruction' noted above.
  2. Clean the power supply and deflection circuitry on the chassis.
  3. Clean the picture tube panel and the neck of the picture tube.

2.3 Warnings

- In order to prevent damage to ICs and transistors, avoid all high voltage flashovers. In order to prevent damage to the picture tube, use the method shown in Fig. 2-1, to discharge the picture tube. Use a high voltage probe and a multi-meter (position Vdc). Discharge until the meter reading is 0 V (after approx. 30 s).

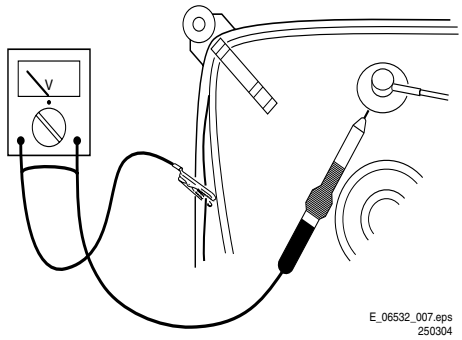


Figure 2-1 Discharge picture tube

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD ⚠). Careless handling during repair can reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this potential.
- Available ESD protection equipment:
  – Complete kit ESD3 (small tablemat, wristband, connection box, extension cable, and ground cable) 4822 310 10671.
  – Wristband tester 4822 344 13999.
- Together with the deflection unit and any multi-pole unit, flat square picture tubes form an integrated unit. The deflection and the multi-pole units are set optimally at the factory. Adjustment of this unit during repair is therefore not recommended.
- Be careful during measurements in the high voltage section and on the picture tube.
- Never replace modules or other components while the unit is switched 'on'.
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

2.4 Notes

2.4.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⏚), or hot ground (⏚), depending on the area of circuitry being tested.
- The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see "Service Modes, Error Codes, and Faultfinding" section) with a color bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 61.25 MHz (NTSC, channel 3).
- Where necessary, measure the waveforms and voltages with (⊓) and without (⊼) aerial signal. Measure the voltages in the power supply section both in normal operation (⏻) and in standby (⏲). These values are indicated by means of the appropriate symbols.
- The picture tube panel has printed spark gaps. Each spark gap is connected between an electrode of the picture tube and the Aquadag coating.
- The semiconductors indicated in the circuit diagram and in the parts lists are completely interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.

2.4.2 Schematic Notes

- All Resistor values are in ohms and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kOhm).
- Resistor values with no multiplier may be indicated with either an 'E' or an 'R' (e.g. 220E or 220R indicates 220 Ohm).
- All Capacitor values are expressed in Micro-Farads (μ = $x10^{-6}$), Nano-Farads (n = $x10^{-9}$), or Pico-Farads (p = $x10^{-12}$).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An 'asterisk' (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Electrical Replacement Parts List. Therefore, always check this list when there is any doubt.

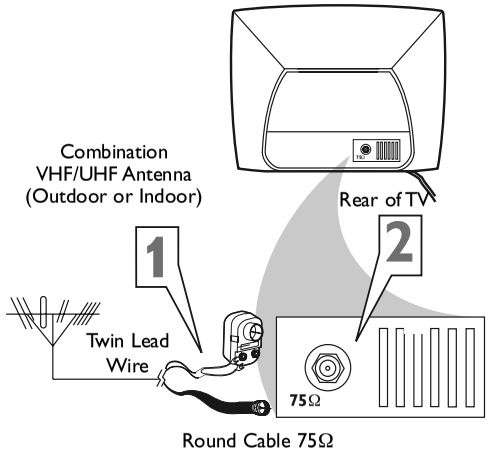
2.4.3 Practical Service Precautions

- **It makes sense to avoid exposure to electrical shock.** While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- **Always respect voltages**. While some may not be dangerous in themselves, they can cause unexpected reactions - reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.
- **Before powering up the TV set with the back cover off** (or on a test fixture), attach a clip lead to the CRT DAG ground and to a screwdriver blade that has a well insulated handle. After the TV is powered on and high voltage has developed, probe the anode lead with the blade, starting at the case of the High Voltage Transformer (flyback - IFT). Move the blade to within two inches of the connector of the CRT. **If there is an arc, you found it the easy way, without getting a shock!** If there is an arc to the screwdriver blade, replace the part which is causing the problem; the High Voltage Transformer or the lead (if it is removable).

1 Basic Antenna Connection

A combination antenna receives normal broadcast channels (VHF 2-13 and UHF 14-69). Your connection is easy since there is only one 75Ω (ohm) antenna plug on the back of your TV - and that's where the antenna goes.

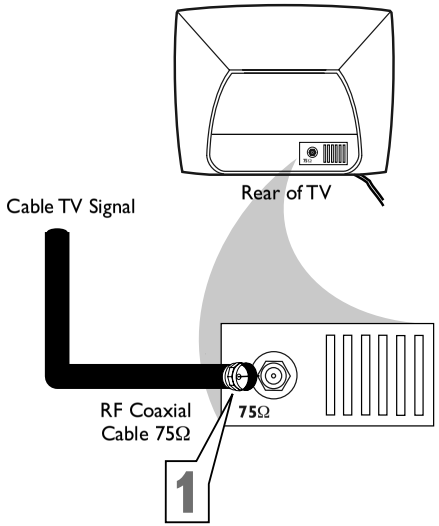
1. **If your antenna has a round cable** (75 ohm) on the end, then you're ready to connect it to the TV. Go to step 2.
   If your antenna has flat twin-lead wire (300 ohm), you first need to attach the antenna wires to the screws on a 300 to 75 ohm adapter (not supplied with TV).
2. **Push the round end** of the adapter or antenna cable onto the 75Ω jack on the rear of the TV. If the round end of the antenna cable is threaded, screw it down tight.



Basic Cable TV Connection

If Cable TV signal into your home is a single cable (75 ohm) the connection to the TV is easy.

1. **Connect the Cable TV** cable directly to the 75Ω jack on the TV.



Helpful Hints

If no Video Signal is present, the TV will display a "BLUE" screen and shut itself off in about 5 minutes. If the TV is tuned to the AV channel and there is no Video Signal present, the screen will remain black and the TV will shut itself off in about 5 minutes.

Use Auto Program as described on panel 9 to set up channels that are available in your area. Use the CH +/– buttons to scan available channels.

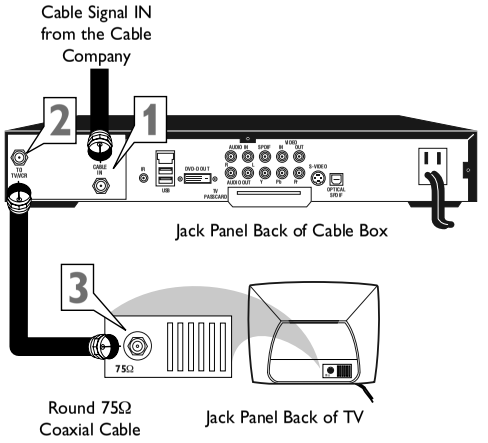
2 Cable Box Connections

If you cable signal uses a cable box or decoder, follow the easy steps below to complete the connection.

Cable Box (w/RF In/Outputs):
This connection will be mono.

1. **Connect the Cable Company supplied cable** to the signal IN(put) plug on the back of the Cable Box.
2. Using a separate round coaxial cable, **connect one end to the OUT(put) (TO TV) plug on the back of the Cable Box.**
3. **Connect the other end of the round coaxial cable** to the 75Ω input on the back of the television. Screw it down finger tight.

NOTE: If applicable, set the OUTPUT CHANNEL SWITCH on the back of the cable box to CH 3 or 4. Tune the TV to the same channel and change channels at the cable box. In some cases, the cable box will automatically tune to either channel 3 or 4, change channels until the picture appears.



Helpful Hints

If no Video Signal is present, the TV will display a "BLUE" screen and shut itself off in about 5 minutes. If the TV is tuned to the AV channel and there is no Video Signal present, the screen will remain black and the TV will shut itself off in about 5 minutes.

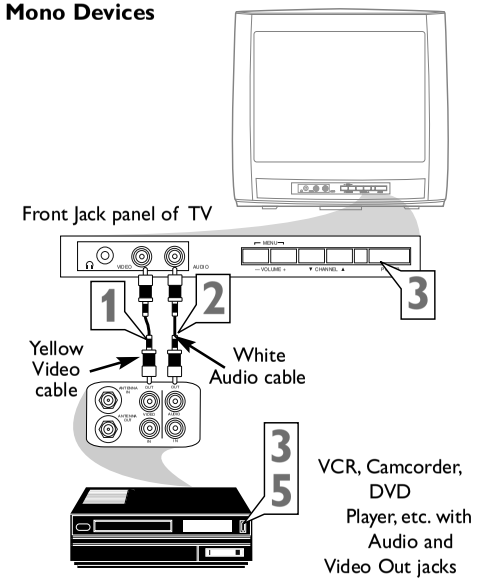
3 Front AV (Audio/Video) Input Connections

Audio and Video Front Inputs are available for a quick connection of a VCR, to playback video from a camera, or attach a gaming device. Use the AV button on the remote control to tune these inputs.

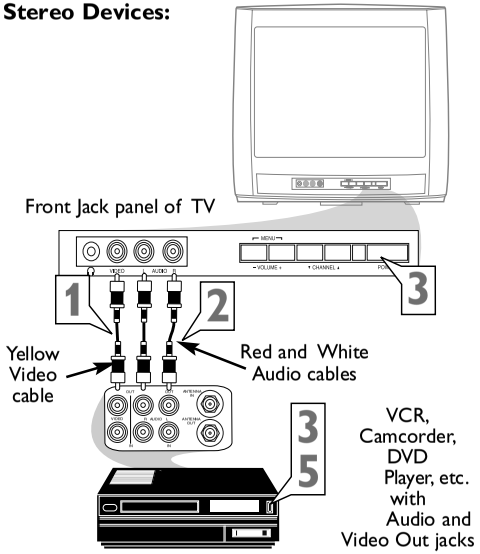
1. **Connect the video (yellow) cable** from the Video output on the Camera (or accessory device) to the Video (yellow) Input located on the FRONT of the TV.
2. **For Mono Devices:** Connect one end of the audio cable from the Audio Out jack on the device to the Audio In (white) jack on the FRONT of the television.

   For Stereo Devices: Connect one end of the audio cables from the Audio Out jacks on the device to the Audio In (red and white) jacks on the FRONT of the television.
3. Turn the TV and the accessory device ON.
4. **Press the CH+ or CH- button** on the remote control to tune the TV to the front input jacks. "Front" will appear on the TV screen.
5. **Press the PLAY ▶ button** on the accessory device to view playback, or to access the accessory device (camera, gaming unit, etc.).

Mono Devices



Stereo Devices:



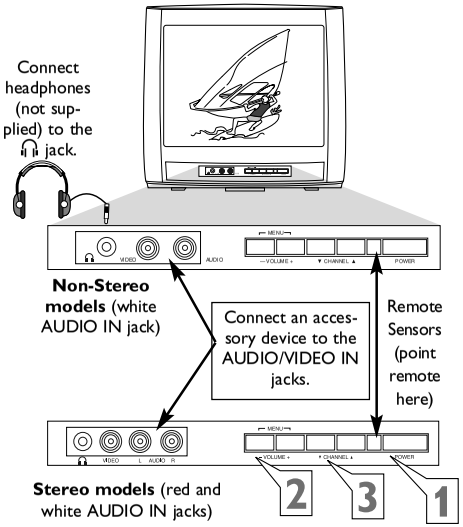
4 Basic TV and Remote Control Illustrations

Television

1. **Press POWER** to turn on the TV.
2. **Press VOLUME +** to increase the sound level. Press **VOLUME –** to lower the sound level. **Press both buttons at the same time** to display the TV's on-screen menu. Once in the menu, use these buttons to make menu adjustments or selections.
3. **Press CHANNEL ▲ or ▼** to select TV channels.

Remote Control

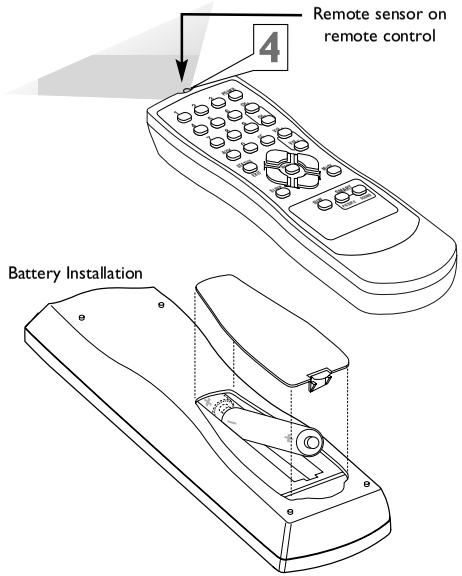
4. Point the remote control toward the remote sensor on the front of the TV when operating the TV.


Connect headphones (not supplied) to the 🎧 jack.
Non-Stereo models (white AUDIO IN jack)
Connect an accessory device to the AUDIO/VIDEO IN jacks.
Remote Sensors (point remote here)
Stereo models (red and white AUDIO IN jacks)
2
3
1

Battery Installation

To load the supplied batteries into the remote:

1. **Remove the battery compartment lid** on the back of the remote.
2. **Place the batteries (two AA) in the remote.** Be sure the (+) and (-) ends of the batteries line up correctly (as marked inside the remote).
3. **Reattach the battery lid.**



Helpful Hints

The current channel number will appear briefly when you first turn on the TV or when you change channels.

Press STATUS/EXIT to see the current channel number.

5 Description of Remote Control Buttons

NUMBER Buttons
Press the Number buttons to select TV channels or to enter values in the menu. For single-digit channels, press the Number button for the channel you want. The TV will pause briefly before going to the chosen channel.

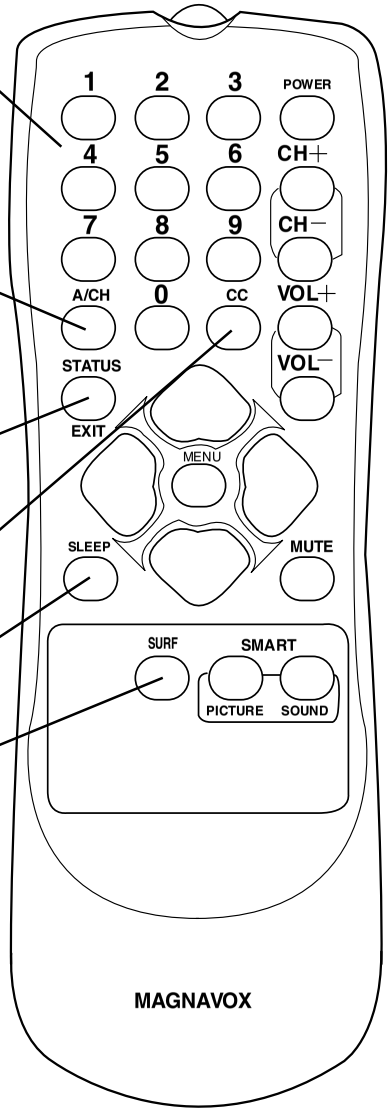
A/CH Button (Alternate Channel)
Press to switch between the last channel and the present channel.
Details are on panel 26.

STATUS/EXIT Button
Press to see the current channel number. Press to remove a menu.

CC Button
Press to activate Closed Captioning.
Details are on panel 24.

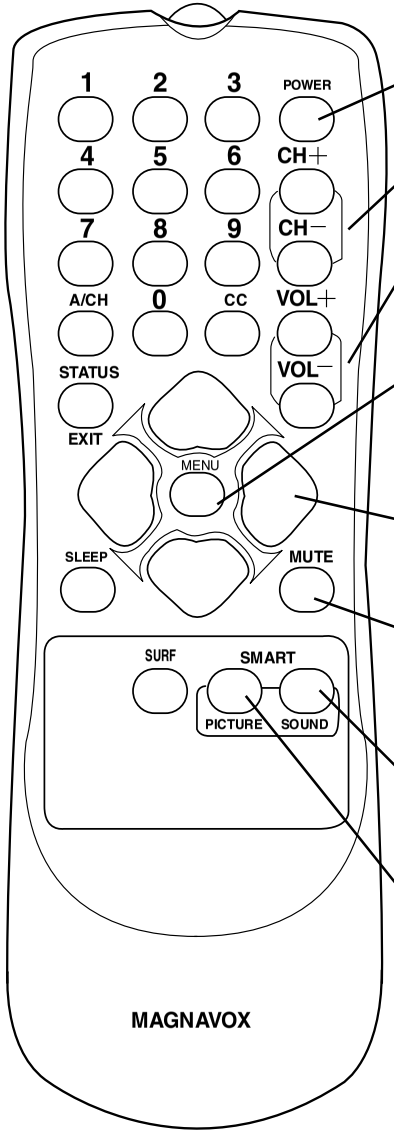
SLEEP Button
Press to set the TV to turn itself off within a certain time. *Details are on panel 24.*

SmartSurf
If your TV model has SmartSurf, press this button to move through the channels you have set. Details are on panel 26.



Continued on Next Panel

6 Description of Remote Control Buttons (Cont'd)



POWER button
Press to turn the TV on or off.

CH(annel) +/– Buttons
Press to scan memorized channels.

VOL(ume) +/– Buttons
Press to increase or decrease the sound.

MENU Button
Press to see the menu. Press repeatedly to return to previous menus or remove the menus.

Arrow ◄ ► ▲ ▼ Buttons
Press to select or adjust items in the menu.

MUTE Button
Press to eliminate or restore the TV sound. MUTE will appear on the TV when the sound is muted.

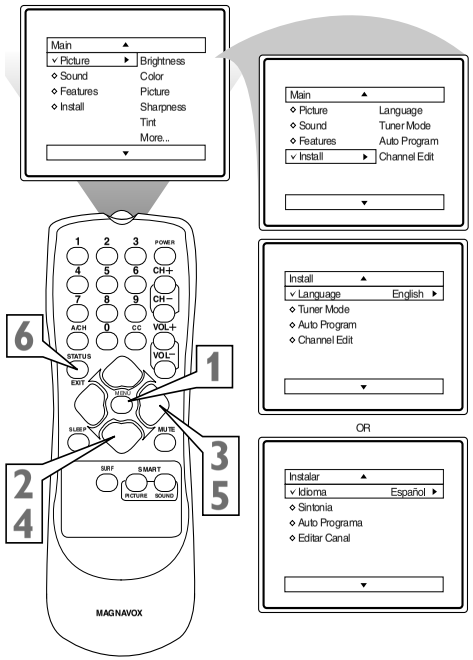
SMART SOUND Button
Press to choose a sound setting.
Details are on panel 25.

SMART PICTURE Button
Press to choose a picture setting.
Details are on panel 25.

7 How to Use the Language Control

For our Spanish speaking TV owners an on-screen LANGUAGE option is present. With the LANGUAGE control you can set the TV's on-screen menu to be shown in either English or Spanish.

1. **Press the MENU button** on the remote to show the on-screen menu.
2. **Press the CURSOR UP ▲ or DOWN ▼ buttons** to scroll through the on-screen menu until the word **INSTALL** is highlighted.
3. **Press the CURSOR RIGHT ▶ button** to display the **INSTALL** menu features.
4. **Press CURSOR UP ▲ or DOWN ▼ buttons** to scroll the Install features until the word **LANGUAGE** is highlighted.
5. **Press the CURSOR RIGHT ▶ button repeatedly** to select **ENGLISH** or **ESPAÑOL** (Spanish).
6. **When finished, press the STATUS /EXIT button** to remove the menu from the TV's screen.



Helpful Hint

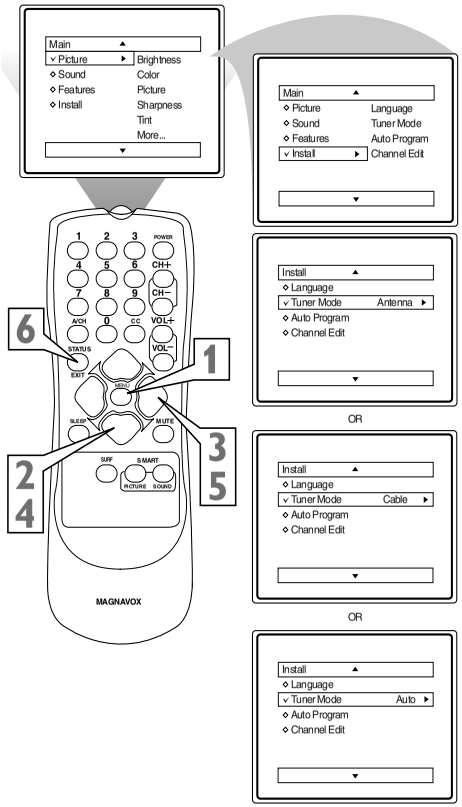
The Language control only makes the TV's on-screen MENU items appear in English or Spanish text.

It does not change the other on-screen text features such as Closed Caption (CC) TV shows.

8 How to Use the Tuner Mode Control

The TUNER MODE control allows you to change the TV's signal input to either ANTENNA, CABLE, or AUTO mode. It's important for the TV to know what type of signal that is connected. (From a Cable TV signal or a normal Antenna signal.) In the AUTO mode, when the AUTO PROGRAM feature is activated, the TV will automatically choose the correct mode.

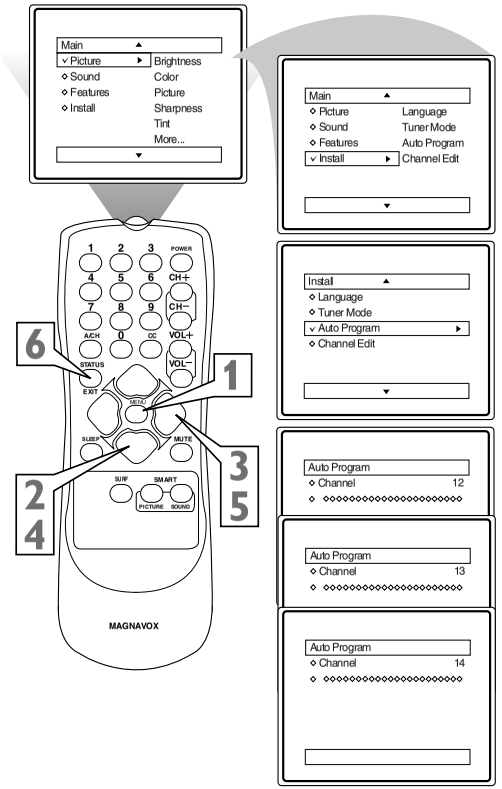
1. **Press the MENU button** on the remote to show the on-screen menu.
2. **Press the CURSOR UP ▲ or DOWN ▼ buttons** to scroll through the on-screen menu until the word **INSTALL** is highlighted.
3. **Press the CURSOR RIGHT ▶ button** to display the **INSTALL** menu features.
4. **Press CURSOR UP ▲ or DOWN ▼ buttons** to scroll the Install features until the words **TUNER MODE** is highlighted.
5. **Press the CURSOR RIGHT ▶ button** to select either **ANTENNA**, **CABLE**, or **AUTO** mode.
6. **When finished, press the STATUS /EXIT button** to remove the on-screen menu from the TV's screen.



9 How to Automatically Program TV

Your TV can automatically set itself for local area (or Cable TV) channels. This makes it easy for you to select only the TV stations in your area when the CHANNEL (+) or (–) buttons are pressed.

Note: Make sure the antenna or cable signal connection has been completed before AUTO PROGRAM is activated.



1. **Press the MENU button** on the remote to show the on-screen menu.
2. **Press the CURSOR UP ▲ or DOWN ▼ buttons** to scroll through the on-screen menu until the word **INSTALL** is highlighted.
3. **Press the CURSOR RIGHT ▶ button** to display the **INSTALL** menu features.
4. **Press CURSOR UP ▲ or DOWN ▼ buttons** to scroll the Install features until the words **AUTO PROGRAM** are highlighted.
5. **Press the CURSOR RIGHT ▶ button** to start the Auto Program scanning of channels. Auto Programming will store all available channels in the TV's memory then tune to the lowest available channel when done.
6. **When finished, press the STATUS/EXIT button** to remove the menu from the TV's screen.

Helpful Hint

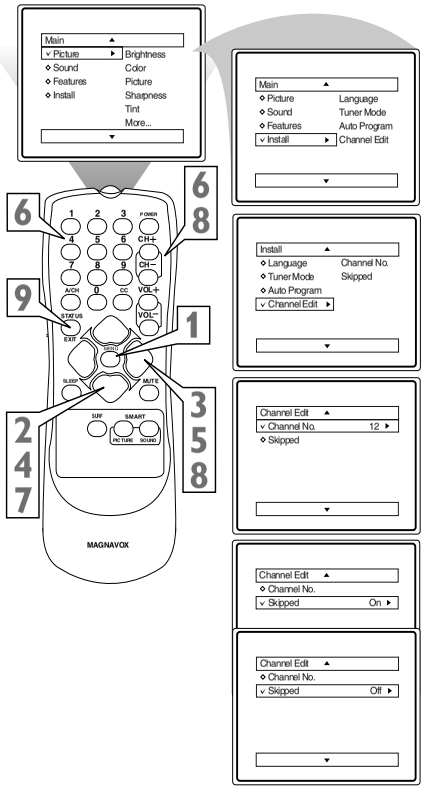
When CABLE is selected, channels 1-125 are available.

When ANTENNA is selected, channels 2-69 are available.

When AUTO is selected, the TV will automatically set itself to the correct mode based on the type of signal it detects when the AUTO PROGRAM feature is activated.

10 How to Add or Delete Channels

Channel Edit makes it easy for you to ADD or DELETE channels from the list of channels stored in the TV's memory.



1. **Press the MENU button** on the remote to show the on-screen menu.
2. **Press the CURSOR UP ▲ or DOWN ▼ buttons** to scroll through the on-screen menu until the word **INSTALL** is highlighted.
3. **Press the CURSOR RIGHT ▶ button** to display the INSTALL menu features.
4. **Press the CURSOR UP ▲ or DOWN ▼ buttons** to scroll the Install features until the words **CHANNEL EDIT** are highlighted.
5. **Press the CURSOR RIGHT ▶ button** to display the **CHANNEL EDIT** options.
6. **With the CHANNEL EDIT options displayed,** and **CHANNEL NO.** highlighted; you can use the cursor buttons to scroll through all available channels that you wish to add (Skipped OFF), or delete (Skipped ON) from the TV's memory. You can also use the **NUMBERED buttons to go directly to a specific numbered channel that you wish to add or skip.** Or, you can also use the CH + or CH - to quickly scan the channels that have not been skipped.
7. **Using the CURSOR DOWN ▼** button, scroll the menu to highlight the word **SKIPPED.**
8. **Now use the CURSOR RIGHT ▶ button to toggle between ON or OFF.**
   If ON is selected the channel is skipped when scrolling channels with the CH + or – buttons. **If OFF is selected** the channel is not skipped when scrolling channels with the CH + or – buttons.
9. **When finished, press the STATUS /EXIT button** to remove the menu from the TV's screen.

Helpful Hint

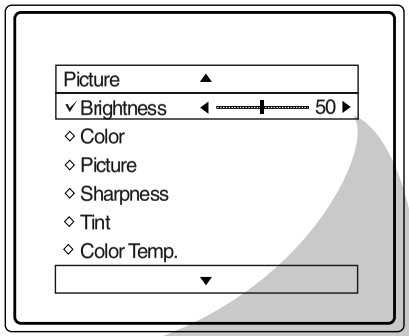
An "X" appearing in front of any channel will indicate that channel has skip on. When the CH + or CH - buttons are used, those channels will be skipped.

In order to get to the external input channel AV, you must use the CURSOR Right ▶ or CURSOR LEFT ◀ buttons.

11 How to Use the Picture Adjustment Controls

To adjust your TV picture controls, select a channel and use the Picture Menu Controls listed below:

1. **Brightness: Press the CURSOR RIGHT ► or LEFT ◄ buttons** until the darkest parts of the picture are as bright as you prefer.
2. **Color: Press the CURSOR RIGHT ► or LEFT ◄ buttons** to add or eliminate color.
3. **Picture: Press the CURSOR RIGHT ► or LEFT ◄ buttons** until lightest parts of the picture show good detail.
4. **Sharpness: Press the CURSOR RIGHT ► or LEFT ◄ buttons to improve detail in the picture.**
5. **Tint: Press the CURSOR RIGHT ► or LEFT ◄ buttons** to obtain natural skin tones.
6. **Color Temp: Press the CURSOR RIGHT ► or LEFT ◄ buttons** to select NORMAL, COOL, or WARM picture preferences. (NORMAL will keep the whites, white; COOL will make the whites, bluish; and WARM will make the whites, reddish.)
7. **Contrast +: Press the CURSOR RIGHT ► or LEFT ◄ buttons** to toggle the control On or OFF. The Contrast + control helps to "sharpen" the picture quality. The black portions of the picture become richer in darkness and the whites become brighter.



✓ Brightness 65

✓ Color 50

✓ Picture 50

✓ Sharpness 50

✓ Tint 0

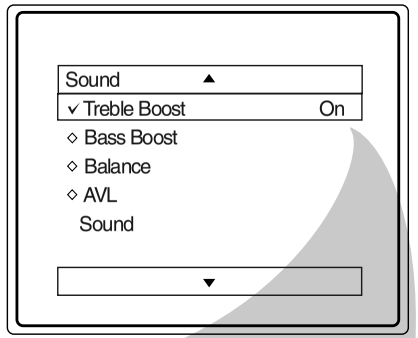
✓ Color Temp. Normal
Warm or Cool

✓ Contrast + On
Off

12 How to Use the Sound Controls (20MS233S Only)

To adjust your TV sound, select and use the Sound Menu Controls listed below.

1. **Treble Boost: Press the ► or ◄** buttons to turn the control On or Off. When On, the control will enhance the high frequency sounds.
2. **Bass Boost: Press the ► or ◄** buttons to turn the control On or Off. When On, the control will enhance the low frequency sounds.
3. **Balance: Press the ► or ◄** buttons to adjust the level of sound coming from the left and right speakers.
4. **AVL:** (Auto Volume Leveler) **Press the ► or ◄** buttons to turn the control On or Off. When On, AVL will level out the sound being heard when sudden changes in volume occur during commercial breaks or channel changes.
5. **Sound: Press the ► or ◄** buttons to select between Stereo or Mono settings. Note: If Stereo is not present on a selected show and the TV is placed in the Stereo mode, the sound coming from the TV will remain in the Mono mode.



✓ Treble Boost On
or Off

✓ Bass Boost On
or Off

✓ Balance L R

✓ AVL On
or Off

✓ Sound Mono
or Stereo

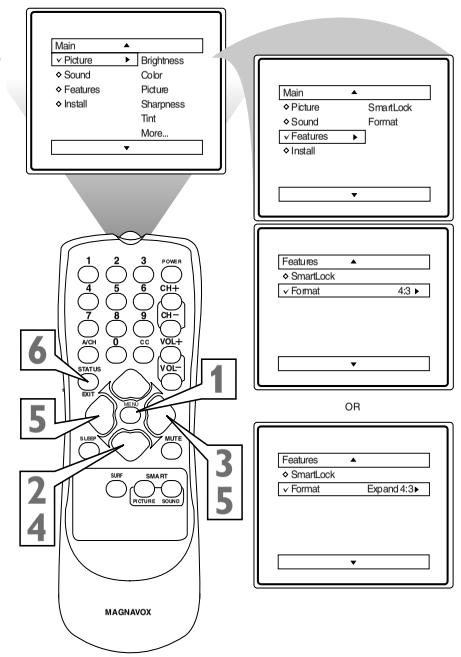
NOTE: These sound options are only available in model 20MS233S. They are not available in 13MT143S or 20MT133S.

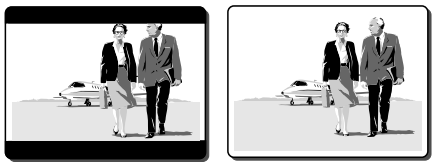
13 How to Use the Format Control (Expand 4:3)

Many times while watching movies from a DVD player the image is shown in "letter box" format. This is the format that is shown in movie theaters. When shown on a TV screen, the image will have areas of black on top and bottom of the screen.

1. **Press the MENU button** on the remote to display the on-screen menu.
2. **Press the CURSOR DOWN ▼ button** until the word **FEATURES** is highlighted.
3. **Press the CURSOR RIGHT ▶ button** to display the **FEATURES** menu options (SmartLock or Format).
4. **Press the CURSOR DOWN ▼ button** until the word **FORMAT** is highlighted.
5. **Press the CURSOR RIGHT ▶ or CURSOR LEFT ◀ buttons** to select one of the two options 4:3 or Expand 4:3.
   4:3 - Standard format for the TV.
   Expand 4:3 - Enlarges the picture to fill out the entire screen area, eliminating the "letter box" effect.
6. **When finished, press the STATUS/EXIT button** to remove the menu from the TV's screen.

Note: The Expand 4:3 format can also be activated using the **CURSOR UP ▲ or DOWN ▼ buttons** when the onscreen menu is not being displayed. Pressing these buttons will toggle the standard 4:3 format and the Expand 4:3 format.





4:3 Expand 4:3

Some models refer to SmartLock as AutoLock in the on-screen menu. These features are the same.

14 Understanding the SmartLock™ Controls

The SmartLock™ feature is an integrated circuit that receives and processes data sent by broadcasters, or other program providers, that contain program content advisories. When programmed by the viewer, a TV with SmartLock™ can respond to the content advisories and block program content that may be found objectionable (such as offensive language, violence, sexual situations, etc.). This is a great feature to censor the type of viewing children may watch.

SmartLock™ offers various BLOCKING controls from which to choose:

Access Code - An Access Code must be set to prevent children from unblocking questionable or censored programming set by their parents.

Channel Block - After an access code has been programmed, you can block individual channels including the A/V inputs.

Clear All - Allows you clear all channels being blocked from your viewing set with the Channel Block Control.

Block All - Allows you to block ALL channels and A/V inputs at one time.

Movie Ratings - Certain blocking options exist which will block programming based on ratings patterned by the Motion Pictures Association of America.

TV Ratings - Just like the Movie Ratings, programs can be blocked from viewing using standard TV ratings set by TV broadcasters.

MOVIE RATINGS

G: General Audience - All ages admitted. Most parents would find this program suitable for all ages.

PG: Parental Guidance Suggested - This programming contains material that parents may find unsuitable for younger children.

PG-13: Parents Strongly Cautioned - This programming contains material that parents may find unsuitable for children under the age of 13.

MOVIE RATINGS Continued

R: Restricted - This is programming is specifically designed for adults. Anyone under the age of 17 should only view this programming with an accompanying parent or adult guardian.

NC-17: No one under the age of 17 will be admitted. - This type of programming should be viewed by adults only.

X: Adults Only - This type of programming contains one or more of the following: very graphic violence, very graphic and explicit or indecent sexual acts, very coarse and intensely suggestive language.

TV RATINGS

TV-Y -- Designed for a very young audience, including children ages 2-6.

TV-Y7 -- It may be appropriate for children age 7 and above who have acquired the development skills needed to distinguish between make-believe and reality.

TV-G -- Suitable for most audiences, this type of programming contains little or no violence, no strong language, and little or no sexual dialogue or situations.

TV-PG -- This program contains material that parents may find unsuitable for younger children. Could contain Moderate violence (V), some sexual situations (S), infrequent coarse language (L), or some suggestive dialogue (D).

TV-14 -- This program contains some material that many parents would find unsuitable for children under 14 years of age. This type of programming contains one or more of the following: intense violence (V), intense sexual situations (S), strong coarse language (L), or intensely suggestive dialogue (D).

TV-MA -- This program is specifically designed to be viewed by adults and therefore may be unsuitable for children under 17. This type of programming contains one or more of the following: graphic violence (V), explicit sexual situations (S), or crude indecent language (L).

15 SETTING UP A SMARTLOCK™ ACCESS CODE

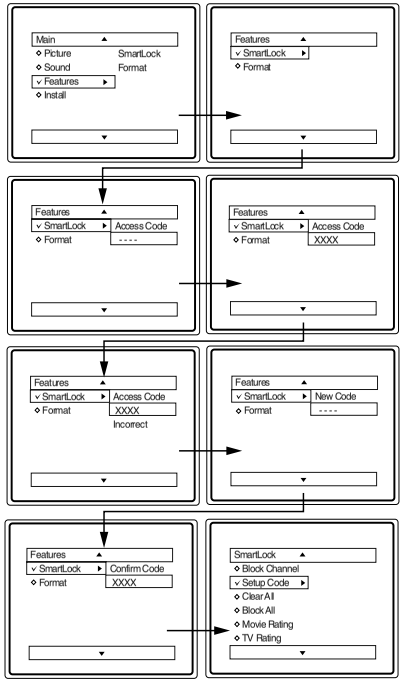
Over the next few panels you'll learn how to block channels and get a better understanding of the rating terms for certain programming.

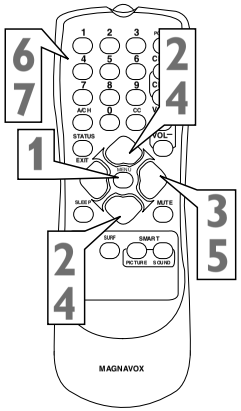
First, let's start by learning how to set a personal access code:

1. **Press the MENU button** on the remote to show the on-screen menu.
2. **Press the CURSOR UP ▲ or DOWN ▼ buttons** until the word **FEATURES** is highlighted.
3. **Press the CURSOR RIGHT ► button** to display the FEATURES menu options.
4. **Press the CURSOR UP ▲ or DOWN ▼ buttons** until the words SmartLock™ are highlighted.
5. **Press the CURSOR RIGHT ► button.** The screen will read, **"ACCESS CODE - - - - ."**
6. **Using the NUMBERED buttons, enter 0, 7, 1, 1. "XXXX"** appears on the Access Code screen as you press the numbered buttons.

   "INCORRECT CODE" will appear on the screen, and **you will need to enter 0, 7, 1, 1 again.**
7. The screen will ask you to enter a "New Code." **Enter a "new" 4 digit code using the NUMBERED buttons.** The screen will then ask you to CONFIRM the code you just entered. **Enter your new code again. "XXXX"** will appear when you enter your new code and then display the SmartLock™ menu options.

Proceed to the next panel to learn more...





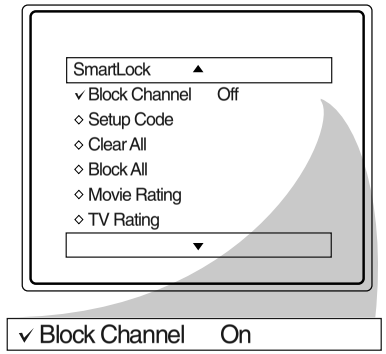
Some models refer to SmartLock as AutoLock in the on-screen menu. These features are the same.

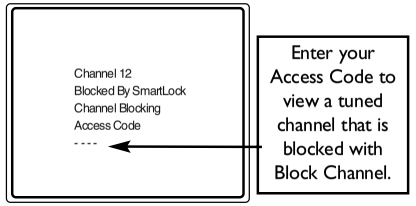
16 HOW TO BLOCK CHANNELS

After your personal access code has been set (see previous page), you are now ready to select the channels or the A/V Inputs you want to block out or censor. Once you've entered your access code and the SmartLock™ features are displayed on the screen:

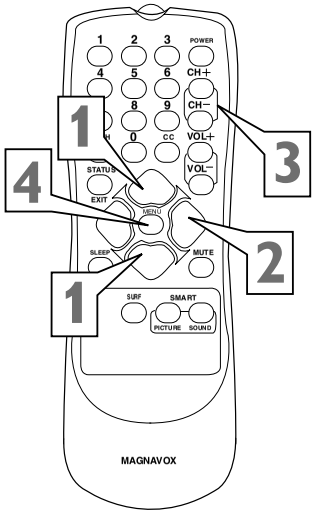
1. **Press the CURSOR UP ▲or DOWN ▼ buttons** until the words **BLOCK CHANNELS** are highlighted.
2. **Press the CURSOR RIGHT ► button** to turn blocking ON or OFF for that channel. When ON is selected the channel will be blocked.
3. **Press the CH + or CH – button** to select other channels you wish to block. Repeat step 9 to block the new channel.
4. **When finished, press the STATUS/EXIT button** to remove the menu from the screen.

NOTE: If you ever forget your code, the 0, 7, 1, 1 code is the factory default and can be used to enter and create a new access code.




Channel 12
Blocked By SmartLock
Channel Blocking
Access Code

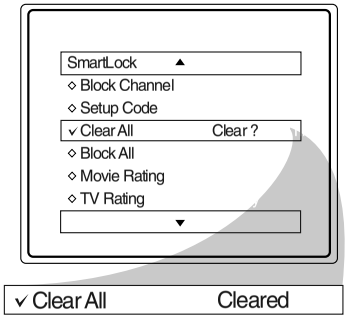
Enter your Access Code to view a tuned channel that is blocked with Block Channel.



Some models refer to SmartLock as AutoLock in the on-screen menu. These features are the same.

17 BLOCKING OR CLEARING ALL CHANNELS AT THE SAME TIME

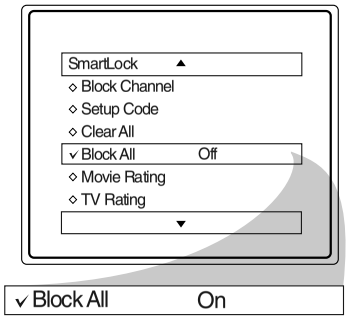
After blocking specific channels there may come a time when you want to block or clear all the channels at the same time.
Once you've entered your access code and the SmartLock™ features are displayed on the screen:



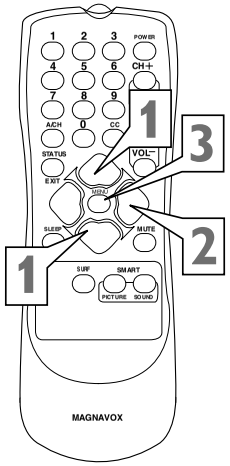
1 **Press the CURSOR UP ▲or DOWN ▼ buttons** to select either CLEAR ALL or BLOCK ALL.

2 **If CLEAR ALL is selected, press the CURSOR RIGHT ► button** to clear all blocked channels. All channels will be viewable.

If BLOCK ALL is selected, press the CURSOR RIGHT ► button to turn the control ON or OFF. When ON is selected, ALL available channels will be blocked from viewing.



3 **When finished, press the STATUS/EXIT button** to remove the menu from the screen.

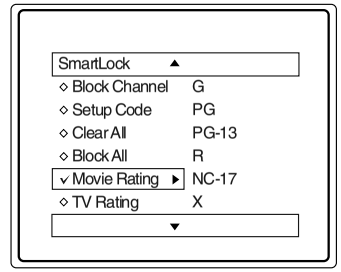


NOTE: If you ever forget your code, the 0, 7, 1, 1 code is the factory default and can be used to enter and create a new access code.

Some models refer to SmartLock as AutoLock in the on-screen menu. These features are the same.

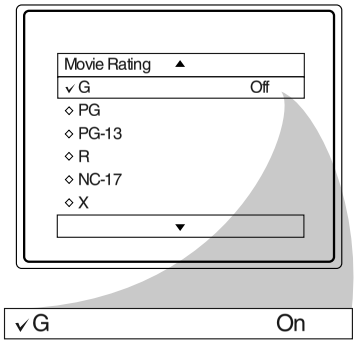
18 BLOCKING PROGRAMS BASED ON MOVIE RATINGS

The SmartLock™ feature can block programming based on the Movie Industry ratings.
Once you've entered your access code and the SmartLock™ features are displayed on the screen:



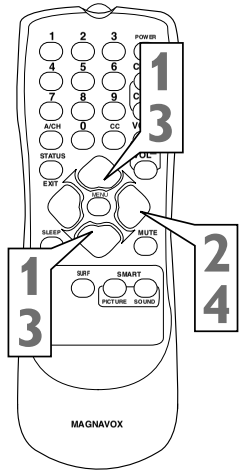
1 **Press the CURSOR UP ▲ or DOWN ▼ buttons** to highlight the words MOVIE RATING.

2 **Press the CURSOR RIGHT ► button** to display the **MOVIE RATING** options (G, PG, PG-13, R, NC17, or X).



3 **Press the CURSOR UP ▲ or DOWN ▼ buttons** to highlight any of the Movie Rating options. When highlighted, all these options can be turned **ON** *(which will allow blocking)* or **OFF** *(which will allow viewing).*

4 **Use the CURSOR RIGHT ► button** on the remote to turn the rating option ON or OFF.



When a rating level is chosen to be blocked, any higher level rating will also be blocked from viewing. (i.e.: If "R" is selected to be blocked, NC-17 and X will automatically be blocked.)

NOTE: If you ever forget your code, the 0, 7, 1, 1 code is the factory default and can be used to enter and create a new access code.

Some models refer to SmartLock as AutoLock in the on-screen menu. These features are the same.

19 BLOCKING PROGRAMS BASED ON TV RATINGS

The SmartLock™ feature can block programming based on the TV Industry ratings.

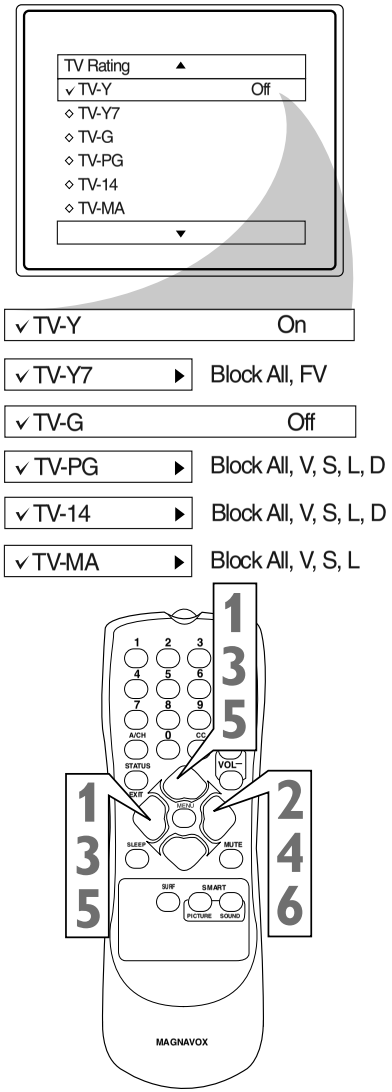
Once you've entered your access code and the SmartLock™ features are displayed on the screen:

1. **Press the CURSOR UP ▲ or DOWN ▼ buttons** to highlight the words TV RATING.
2. **Press the CURSOR RIGHT ► button** to display the **TV RATING** options (TV-Y, TV-Y7, TV-G, TV-PG, TV-14, or TV-MA).
3. **Press the CURSOR UP ▲ or DOWN ▼ buttons** to highlight any of the TV Rating options. When highlighted, all these options can be turned **ON** *(which will allow blocking)* or **OFF** *(which will allow viewing).*

NOTE: Some TV RATING options also have sub-ratings. The ratings of TV-Y7, TV-PG, TV-14, TV-MA can be customized to block V (violence), FV (fantasy violence), S (sexual situations), L (coarse language), or D (suggestive dialogue).

4. **Press the CURSOR RIGHT ► button** on the remote to turn the TV-Y or TV-G rating ON or OFF. **Or, press the CURSOR RIGHT ► button** to enter the sub-menus for the TV-Y7, TV-PG, TV-14 or TV-MA ratings.
5. If the TV-Y7, TV-PG, TV-14 or TV-MA sub-menu is accessed, **press the CURSOR UP ▲ or DOWN ▼ buttons** to select one of the options (Block All, V, S, L, D, or FV).
6. **Press the CURSOR RIGHT ► button** on the remote to turn the option ON or OFF.

Some models refer to SmartLock as AutoLock in the on-screen menu. These features are the same.



20 OTHER SMARTLOCK™ BLOCKING OPTIONS

SmartLock™ offers the viewer other blocking features as well. With these Blocking Options, the censoring can be turned ON or OFF.
Once you've entered your access code and the SmartLock™ features are displayed on the screen:

1. **Press the CURSOR UP ▲ or DOWN ▼ buttons** until the words **BLOCKING OPTIONS** are highlighted.
2. **Press the CURSOR RIGHT ► button** to display the **Blocking Options (BLOCKING, UNRATED, or NO RATING) menu.**

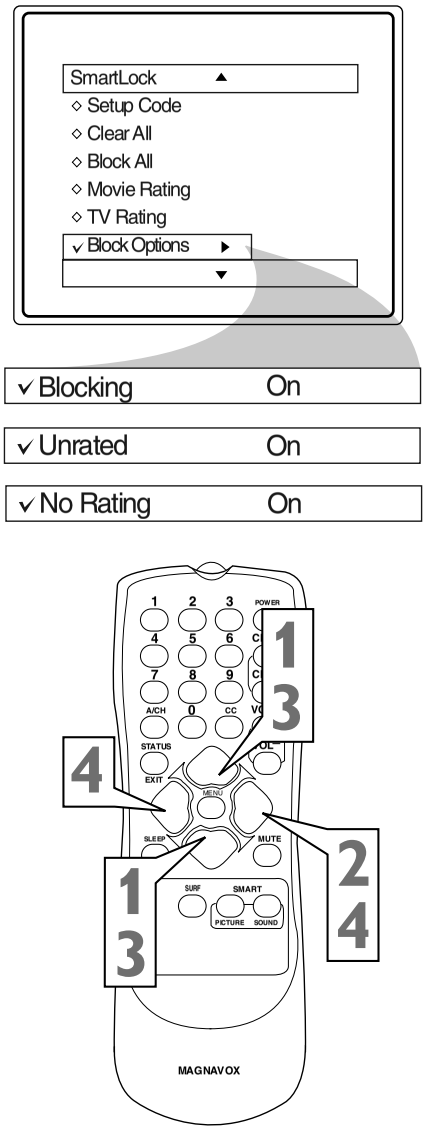
BLOCKING: Might be called the "master switch" for SmartLock™. When ON, ALL blocking/censoring will take place. When OFF, ALL blocking is disabled.

UNRATED: ALL unrated programs based on the Movie Ratings or Parental (TV) Guidelines can be blocked if this feature is set to ON and the BLOCKING feature is set to OFF.

NO RATING: ALL programming with NO content advisory data can be blocked if set to ON and the BLOCKING feature is set to OFF.

3. **Press the CURSOR UP ▲ or DOWN ▼ buttons** to highlight the desired feature.
4. When highlighted, each feature can be turned **ON** or **OFF using the CURSOR RIGHT ► or LEFT ◄ buttons** on the remote.

Some models refer to SmartLock as AutoLock in the on-screen menu. These features are the same.



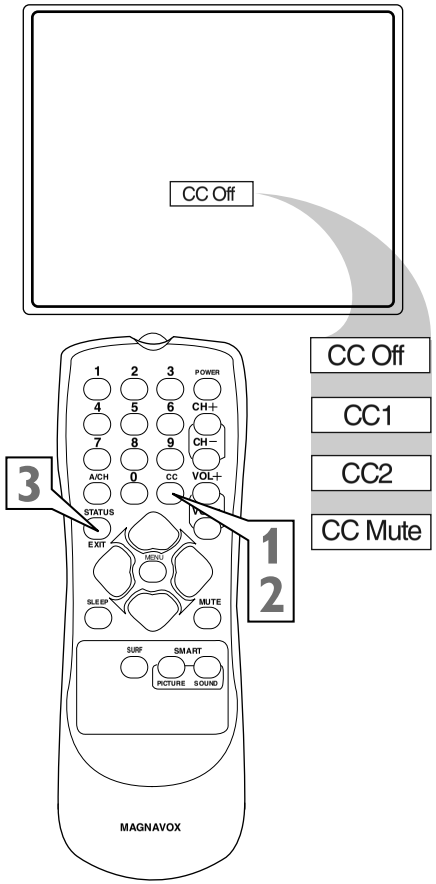
21 How to use the Closed Caption Controls

Closed Captioning (CC) allows you to read the voice content of television programs on the TV screen. Designed to help the hearing impaired, this feature uses on-screen "text boxes" to show dialogue and conversations while the TV program is in progress.

1 **Press the CC button** on the remote to display the current Closed Caption setting.

2 **Press the CC button repeatedly** to choose from the four Closed Caption options (CC Off, CC1, CC2, or CC Mute). CC Mute will activate Closed Captioning when the MUTE button is pressed.

3 **When finished, press the STATUS /EXIT button** to remove the menu from the TV's screen.



Helpful Hint

Not all TV programs and product commercials are made with Closed Caption (CC) information included. Neither are all Closed Caption modes (CC1, or CC2) necessarily being used during the transmission of a closed caption program. Refer to your area's TV program listings for the stations and times of Closed Caption shows.

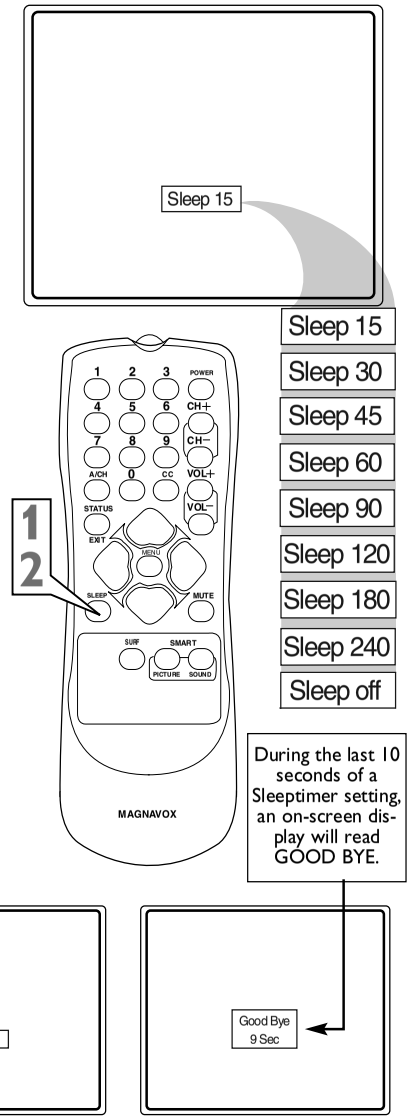
22 Setting the Sleeptimer Control

Your TV can be set to automatically turn itself off at a given amount of time.

1 **Press the SLEEP button** on the remote control and the SLEEP timer display will appear on the screen.

2 **Press the SLEEP button** repeatedly to pick the amount of time (15, 30, 45, 60, 90, 120, 180, or 240 minutes) before the TV will turn itself off.

NOTE: An on-screen count down will appear during the last minute before the TV shuts itself off. If any button is pressed during the last minute of the countdown, the Sleeptimer setting will be cancelled.



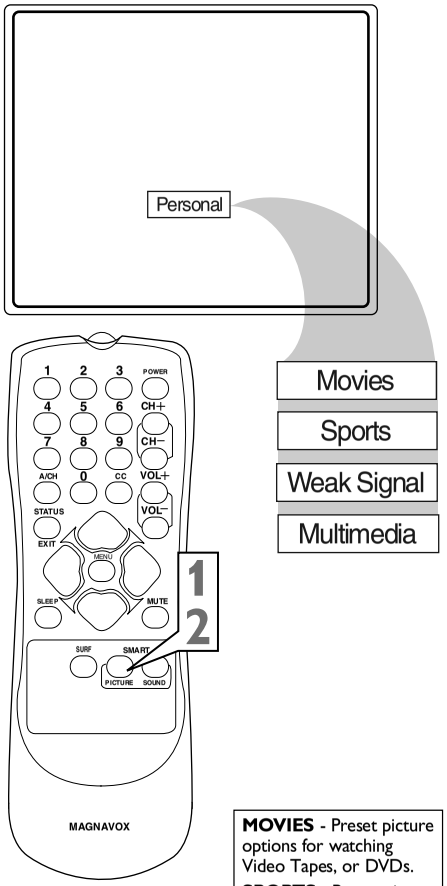
23 USING THE SMARTPICTURE™ CONTROL

Whether you're watching a movie or a sporting event, your TV has automatic video control settings matched for your current program source or content.

1 **Press the SMART PICTURE button** on the remote control. The current Smart Picture setting will be displayed on the screen.

2 **Press the SMART PICTURE button repeatedly** to select either PERSONAL, MOVIES, SPORTS, WEAK SIGNAL, or MULTIMEDIA picture settings.

NOTE: The way you choose to set the Picture Menu Controls will become your PERSONAL setting.



MOVIES - Preset picture options for watching Video Tapes, or DVDs.

SPORTS - Preset picture options for watching sporting events.

WEAK SIGNAL - Preset picture options for watching programs where the reception is not at its best.

MULTIMEDIA - Preset picture options for use with video gaming.

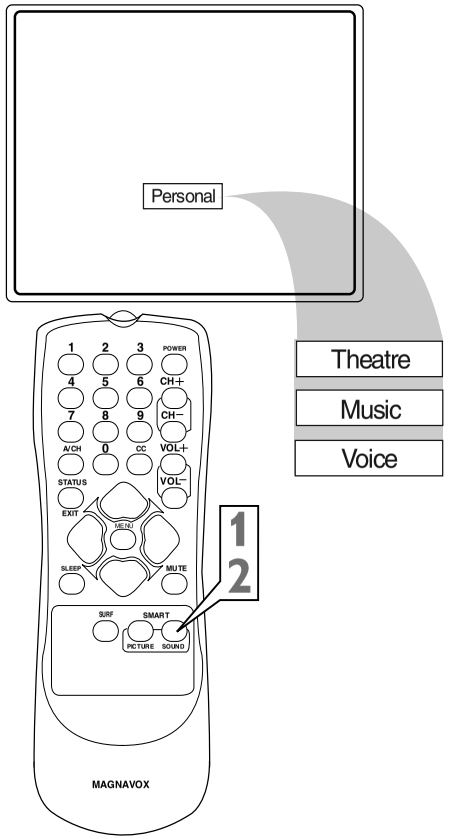
24 USING THE SMARTSOUND™ CONTROL

The Smart Sound feature allows the listener to select between four different factory set sound options.

1 **Press the SMART SOUND button** on the remote control. The current Smart Sound setting will appear in the middle of the screen.

2 **Press the SMART SOUND button repeatedly** to toggle between the four settings. (PERSONAL, VOICE, MUSIC, or THEATRE)

NOTE: The way you choose to set the Sound Menu Controls will become your PERSONAL setting.



THEATRE - Preset sound options for watching movies.

MUSIC - Preset sound options for musical programming where there is little or no dialogue.

VOICE - Preset sound options for programming where heavy dialogue is present.

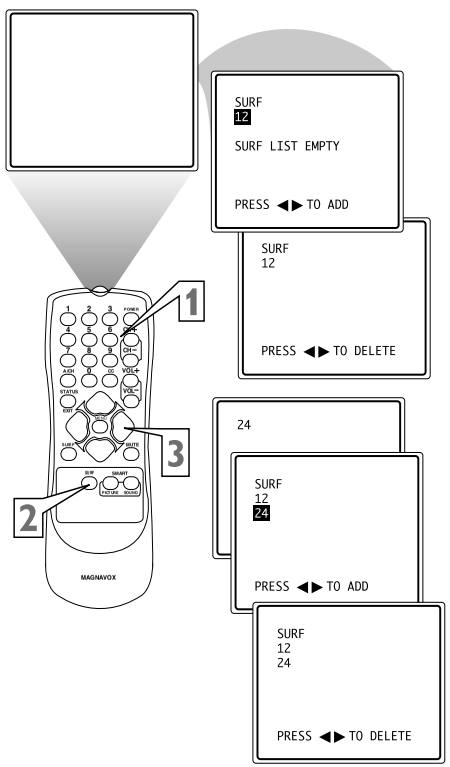
25 USING THE SMARTSURF™ CONTROL

SmartSurf lets you set up to eight channels in a quick viewing list. Then, you can use the SURF button on the remote control to switch between different TV programs that currently interest you.

1 **Press CH +/–** or the Number buttons to select a channel to add to the SURF list.

2 **Press SURF** while the channel number appears.

3 **Press ► or ◄ to add the channel to the SURF list or delete it from the list.** An on-screen message will indicate whether you are adding or deleting the channel. Repeat steps 1 through 3 to add additional channels (up to eight) to the SURF list.



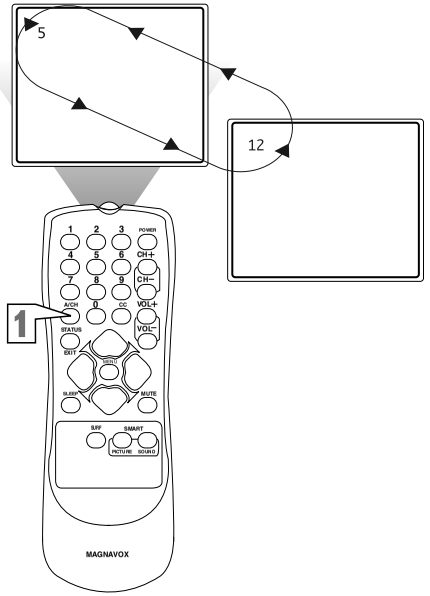
Press SURF repeatedly during TV viewing to scan through the channels in the SURF list.

26 ALTERNATE CHANNEL

Your remote control has an Alternate Channel button that allows you to toggle between the current and previous button. For instance, if you are watching two games on TV, you can enter the channel numbers once and flip between the two channels with the touch of only one button.

After entering the two channels numbers, so that one is the last viewed channel and the other is the current channel, follow the step below.

1 **Press the A/CH button** on the remote control. The channels will toggle between the current channel and the last viewed channel.



4. Mechanical Instructions

Index:

1. Rear cover removal.
2. Service Position Main panel.
3. Rear cover mounting.

4.1 Rear Cover Removal

1. Remove all fixation screws of the rear cover.
2. Now pull the rear cover in backward direction to remove it.

4.2 Service Position Main Panel

1. Disconnect the strain relief of the AC power cord.
2. Remove the main panel, by pushing the two center clips outward [1]. At the same time pull the panel away from the CRT [2].
3. If necessary, disconnect the degaussing coil by removing the cable from the (red) connector 0212.
4. Move the panel somewhat to the left and flip it 90 degrees [3], with the components towards the CRT.

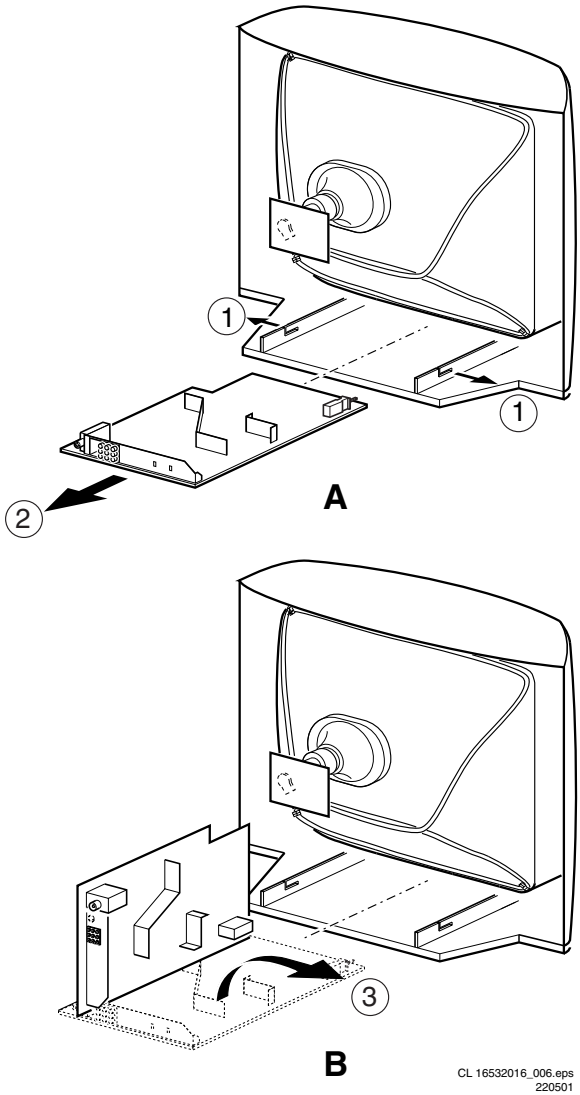


Figure 4-1 Service Position

4.3 Rear Cover Mounting

Before you mount the rear cover, perform the following checks:

1. Check whether the mains cord is mounted correctly in its guiding brackets.
2. Re-place the strain relief of the AC power cord into the cabinet.
3. Check whether all cables are replaced in their original position

5. Service Modes, Error Codes, and Fault Finding

Index:

1. Test points.
2. Service Modes.
3. Problems and Solving Tips.
4. ComPair
5. Error Codes.
6. The Blinking LED Procedure.
7. Protections.
8. Repair Tips.

5.1 Test Points

This chassis is equipped with test points in the service printing. In the schematics test points are identified with a rectangle box around Fxxx or Ixxx. On the PCB, test points are specifically mentioned in the service manual as “half moons” with a dot in the center.

Table 5-1 Test Point Overview

TEST POINT	CIRCUIT	DIAGRAM
P1,P2,P3,P4,P5	POWER SUPPLY	A1
D1,D2,D3,D4,D5,D6,D7,D8,D9,D10	Deflection	A2
T1	TUNER & IF	A3
V1,V2,V3,V4,V5,V6,V7,V8,V9,V10,V11	VIDEO PROCESSING	A4
A1,A2,A3,A4,A5	AUDIO PROCESSING	A5
A7,A8,A9,A10,A11	AUDIO AMPLIFIER + MONO SOUND PROCESSING	A6
F1	FRONT IO + FRONT CONTROL + HEADPHONE	A7
V12,V13,V14,V15,V16,V17	CRT PANEL	B1

Perform measurements under the following conditions:
- Service Default Alignment Mode.
- Video: color bar signal.
- Audio: 3 kHz left, 1 kHz right.

5.2 Service Modes

Service Default Alignment Mode (SDAM) offers several features for the service technician.

There is also the option of using ComPair, a hardware interface between a computer (see requirements) and the TV chassis. It offers the ability of structured trouble shooting, error code reading and software version readout for all chassis. Requirements: To run ComPair on a computer (laptop or desktop) requires, as a minimum, a 486 processor, Windows 3.1 and a CD-ROM drive. A Pentium Processor and Windows 95/98 are however preferred (see also paragraph 5.4).

Table 5-2 SW Cluster

SW Cluster	Software name	UOC type	UOC Diversity	Special Features
L3SUM1	L03UM1 x.y	TDA9377	55K ROM Size	Mono
L3SUN1	L03UN1 x.y	TDA9377	55K ROM Size	Stereo (non DBX)
Abbreviations in Software name: U = Nafta, M = Mono, N = Stereo.				

5.2.1 Service Default Alignment Mode (SDAM)

Purpose
- To change option settings.
- To create a predefined setting to get the same measurement results as given in this manual.
- To display / clear the error code buffer.
- To override SW protections.
- To perform alignments.
- To start the blinking LED procedure.

Specifications
- Tuning frequency: 61.25 MHz (channel 3) for NTSC-sets (Nafta).
- Color system: NTSC-M.
- All picture settings at 50 % (brightness, color contrast, hue).
- Bass, treble and balance at 50 %; volume at 25 %.
- All service-unfriendly modes (if present) are disabled, like:
  - (Sleep) timer,
  - Child/parental lock,
  - Blue mute,
  - Hotel/hospitality mode
  - Auto switch-off (when no “IDENT” video signal is received for 15 minutes),
  - Skip / blank of non-favorite presets / channels,
  - Auto store of personal presets,
  - Auto user menu time-out.
- Operation hours counter.
- Software version.
- Option settings.
- Error buffer reading and erasing.
- Software alignments.

How to enter SDAM

Use one of the following methods:
- Use a standard customer RC-transmitter and key in the code 062596 directly followed by the “M” (menu) button or
- Short jumper wires 9257 and pin 4 of 7200 on the mono carrier (see Fig. 8-1) and apply AC power. Then press the power button (remove the short after start-up).
- Caution: Entering SDAM by shorten wires 9257 and pin 4 of 7200 will override the +8V-protection. Do this only for a short period. When doing this, the service-technician must know exactly what he is doing, as it could lead to damaging the set.
- Or via ComPair.

After entering SDAM, the following screen is visible, with S at the upper right side for recognition.

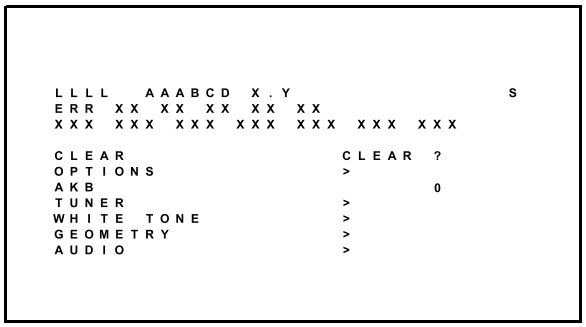


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Figure 5-1 SDAM Menu

- **LLLL.** This is the operation hours counter. It counts the normal operation hours, not the standby hours.
- **AAABCD-X.Y.** This is the software identification of the main micro controller:
  - A = the project name (L03).
  - B = the region: E= Europe, A= Asia Pacific, U= NAFTA, L= LATAM.
  - C = the feature of software diversity: N = stereo non-DBX, S = stereo dBx, M = mono, D = DVD
  - D = the language cluster number:
  - X = the main software version number.
  - Y = the sub software version number.
- **S.** Indication of the actual mode. S= SDAM= Service Default Alignment mode.
- **Error buffers.** Five errors possible.
- **Option bytes.** Seven codes possible.
- **Clear.** Erase the contents of the error buffer. Select the CLEAR menu item and press the CURSOR RIGHT key. The content of the error buffer is cleared.
- **Options.** To set the Option Bytes. See chapter 8.3.1 for a detailed description.
- **AKB.** Disable (0) or enable (1) the “black current loop” (AKB = Auto Kine Bias).
- **Tuner.** To align the Tuner. See chapter 8.3.2 for a detailed description.
- **White Tone.** To align the White Tone. See chapter 8.3.3 for a detailed description.
- **Geometry.** To align the set geometry. See chapter 8.3.4 for a detailed description.
- **Audio. Use default value (Stereo set only),** align when necessary. See chapter 8.3.x for a detailed description.

How to navigate
- In SDAM, select menu items with the CURSOR UP/DOWN key on the remote control transmitter. The selected item will be highlighted. When not all menu items fit on the screen, move the CURSOR UP/DOWN key to display the next / previous menu items.
- With the CURSOR LEFT/RIGHT keys, it is possible to:
  - Activate the selected menu item.
  - Change the value of the selected menu item.
  - Activate the selected submenu.
- When you press the MENU button twice, the set will switch to the normal user menus (with the SDAM mode still active in the background). To return to the SDAM menu press the OSD / STATUS button.
- When you press the MENU key in a submenu, you will return to the previous menu.

How to store settings
To store settings, leave the SDAM mode with the Standby button on the remote.

How to exit
Switch the set to STANDBY by pressing the power button on the remote control (if you switch the set 'off' by removing the AC power, the set will return in SDAM when AC power is re-applied). The error buffer is **not** cleared.

5.3 Problems and Solving Tips

5.3.1 Picture Problems

Note: Below described problems are all related to the TV settings. The procedures to change the value (or status) of the different settings are described.

No colors / noise in picture
1. Press the MENU button on the remote control.
2. Select the INSTALLATION sub menu.
3. Select and change the SYSTEM setting until picture and sound are correct.
4. Select the STORE menu item.

Colors not correct / unstable picture
1. Press the MENU button on the remote control.
2. Select the INSTALLATION sub menu.
3. Select and change the SYSTEM setting until picture and sound are correct.
4. Select the STORE menu item.

Picture too dark or too bright
Increase / decrease the BRIGHTNESS and / or the CONTRAST value when:
- The picture improves after you have pressed the “Smart Picture” button on the remote control.
- The picture improves after you have switched on the Customer Service Mode

The new “Personal” preference value is automatically stored.

White line around picture elements and text
Decrease the SHARPNESS value when:
- The picture improves after you have pressed the “Smart Picture” button on the remote control.

The new “Personal” preference value is automatically stored.

Snowy picture
- No or bad antenna signal. Connect a proper antenna signal.
- Antenna not connected. Connect the antenna.
- No channel / pre-set is stored at this program number. Go to the INSTALL menu and store a proper channel at this program number.
- The tuner is faulty (in this case the CODES line will contain error number 10). Check the tuner and replace / repair if necessary.

Snowy picture and/or unstable picture
- A scrambled or decoded signal is received.

Black and white picture
Increase the COLOR value when:
- The picture improves after you have pressed the “Smart Picture” button on the remote control.

The new “Personal” preference value is automatically stored.

Menu text not sharp enough
Decrease the CONTRAST value when:
The picture improves after you have pressed the “Smart Picture” button on the remote control.
The new “Personal” preference value is automatically stored.

5.3.2 Sound Problems

No sound or sound too loud (after channel change / switching on)
Increase / decrease the VOLUME level.
Press the Smart Sound button repeatedly to access 4 different types of sound settings and choose your desired setting.

5.4 ComPair

5.4.1 Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the European DST (service remote control), which allows faster and more accurate diagnostics. ComPair has three big advantages:
- ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.
- ComPair allows very detailed diagnostics (on I2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I2C commands yourself because ComPair takes care of this.

- ComPair speeds up the repair time since it can automatically communicate with the chassis (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the SearchMan electronic manual of the defective chassis, schematics and PWBs are only a mouse click away.

5.4.2 Specifications

ComPair consists of a Windows based faultfinding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial or RS232 cable.
In case of the L01 chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector (located on the Main panel, (see figure "Top view Mono Carrier".in chapter 8 "Alignments").

The ComPair faultfinding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in two ways:
- **Automatic** (by communication with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on I2C level. ComPair can access the I2C bus of the television. ComPair can send and receive I2C commands to the micro controller of the television. In this way, it is possible for ComPair to communicate (read and write) to devices on the I2C busses of the TV-set.
- **Manually** (by asking questions to you): Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extends. When this is not the case, ComPair will guide you through the faultfinding tree by asking you questions (e.g. *Does the screen give a picture? Click on the correct answer: YES / NO*) and showing you examples (e.g. *Measure test-point I7 and click on the correct oscillogram you see on the oscilloscope*). You can answer by clicking on a link (e.g. text or a waveform picture) that will bring you to the next step in the faultfinding process.

By a combination of automatic diagnostics and an interactive question / answer procedure, ComPair will enable you to find most problems in a fast and effective way.

Beside fault finding, ComPair provides some **additional features** like:
- Up- or downloading of pre-sets.
- Managing of pre-set lists.
- Emulation of the Dealer Service Tool (DST).
- If both ComPair and SearchMan (Electronic Service Manual) are installed, all the schematics and the PWBs of the set are available by clicking on the appropriate hyperlink.
  Example: *Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Mono-carrier.*
  – Click on the 'Panel' hyperlink to automatically show the PWB with a highlighted capacitor C2568.
  – Click on the 'Schematic' hyperlink to automatically show the position of the highlighted capacitor.

5.4.3 How To Connect ComPair

1. First, install the ComPair Browser software (see the Quick Reference Card for installation instructions).
2. Connect the RS232 interface cable between a free serial (COM) port of your PC and the PC connector (marked with “PC”) of the ComPair interface.
3. Connect the AC power adapter to the supply connector (marked with “POWER 9V DC”) on the ComPair interface.
4. Switch the ComPair interface OFF.
5. Switch the television set OFF (remove the AC power).
6. Connect the ComPair interface cable between the connector on the rear side of the ComPair interface (marked with “I2C”) and the ComPair connector on the mono carrier (see figure "Top view Mono Carrier".in chapter 8 "Alignments").
7. Plug the AC power adapter in the AC power outlet and switch on the interface. The green and red LEDs light up together. The red LED extinguishes after approx. 1 second while the green LED remains lit.
8. Start the ComPair program and read the “introduction” chapter.

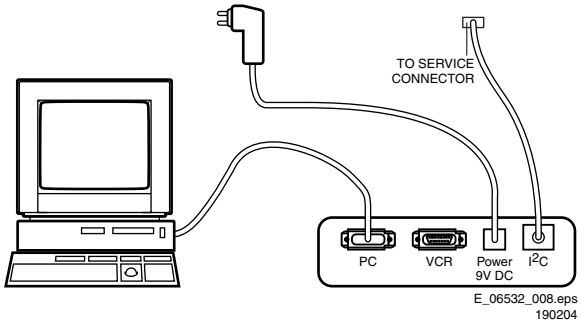

Figure 5-2 ComPair connection

5.4.4 How To Order

ComPair order codes:
- ComPair Software: ST4191.
- ComPair Interface Box: 4822 727 21631.
- AC Adapter: T405-ND.
- ComPair Quick Start Guide: ST4190.

Note: If you encounter any problems, contact your local support desk.

5.4.5 Error Buffer

The error code buffer contains all detected errors since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is written at the left side and all other errors shift one position to the right.

5.4.6 How To Read The Error Buffer

You can read the error buffer in 3 ways:
- On screen via the SDAM (only if you have a picture). Examples:
  – ERROR: 0 0 0 0 0: No errors detected
  – ERROR: 6 0 0 0 0: Error code 6 is the last and only detected error
  – ERROR: 9 6 0 0 0: Error code 6 was first detected and error code 9 is the last detected (newest) error
- Via the blinking LED procedure (when you have no picture). See next paragraph.
- Via ComPair.

5.4.7 How To Clear The Error Buffer

The error code buffer is cleared in the following cases:
- By activation of the CLEAR command in the SDAM menu:
- If the content of the error buffer has not changed for 50 hours, it resets automatically.

Note:
When leaving SDAM by disconnecting the set from AC power, the error buffer is not reset.

5.5 Error Codes

In case of non-intermittent faults, clear the error buffer before you begin the repair. These to ensure that old error codes are no longer present.
If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error code and not the actual cause (e.g., a fault in the protection detection circuitry can also lead to a protection).

Table 5-3 Error Code Table

ERROR	Device	Error description	Check item	Diagram
0	Not applicable	No Error	-	-
1	Not applicable	X-Ray Protection (USA)	7421, 2423, 6421, 6422	A2
2	Not applicable	Horizontal Protection	7421, 7422, 7423	A2
3	Not applicable	Vertical Protection	7461, 7462, 7463, 7464, 7465, 7466	A2
4	TDA9853H	Tone control & Audio processor I2C identification error	7861 (Stereo/Sap)	A5
5	TDA93XX	POR 3.3V / 8V Protection	7200, 7541, 7491, 7493, 7496	A4, A1
6	I2C bus	General I2C bus error	7200, 3604, 3605	A4
7	Not applicable	-	-	-
8	Not applicable	E/W Protection (Large Screen)	-	-
9	M24C16	NVM I2C identification error	7641, 3641, 3642, 3643	A4
10	Tuner	Tuner I2C identification error	1000, 3003, 3004	A3
11	Not applicable	Black current loop protection	3313, 7307, 7308, 7309, 7310, 7311, 7312, 7313, 7314, 7315, 7316, 7317, 7318, CRT	B1
12	Not applicable	MAP I2C identification error (USA)	-	-
13	Not applicable	VC I2C identification error (Eu)	-	-
14	Not applicable	DVD I2C identification error	-	-

5.6 The Blinking LED Procedure

Via this procedure, you can make the contents of the error buffer visible via the front LED. This is especially useful when there is no picture.

When the SDAM is entered, the LED will blink the contents of the error-buffer.
- n short blinks (n = 1 - 14),
- When all the error-codes are displayed, the sequence finishes with a LED blink of 3 s,
- The sequence starts again.

Example of error buffer: 12 9 6 0 0
After entering SDAM:
- 12 short blinks followed by a pause of 3 s,
- 9 short blinks followed by a pause of 3 s,
- 6 short blinks followed by a pause of 3 s,
- 1 long blink of 3 s to finish the sequence,
- the sequence starts again.

5.7 Protections

If a fault situation is detected an error code will be generated and if necessary the set will be put in the protection mode. Blinking of the red LED at a frequency of 3 Hz indicates the protection mode. In some error cases, the microprocessor does not put the set in the protection mode. The error codes of the error buffer can be read via the service menu (SDAM), the blinking LED procedure or via ComPair.

To get a quick diagnosis the chassis has one service modes implemented:
- The Service Default Alignment Mode (SDAM). Start-up of the set in a predefined way and adjustment of the set via a menu and with the help of test patterns.

5.8 Repair Tips

Below some failure symptoms are given, followed by a repair tip.
- **Set is dead and makes hiccupping sound.** “Main Supply” is available. Hiccupping stops when de-soldering L5563, meaning that problem is in the “Main Supply” line. No output voltages at LOT, no horizontal deflection. Reason: line transistor 7421 is defective.
- **Set is dead, and makes no sound.** Check power supply IC 7520. Result: voltage at pins 2, 6, 7, 9 and 11 are about 180 V and pin 14 is 0 V. The reason why the voltage on these pins is so high is because the output driver (pin 11) has an open load. That is why MOSFET 7521 is not able to switch. Reason: feedback resistor 3523 is defective. **Caution:** be careful measuring on the gate of 7521; circuitry is very high ohmic and can easily be damaged!
- **Set is in hiccup mode and shuts down after 8 s.** Blinking LED (set in SDM mode) indicates error 5. As it is unlikely that the “POR” and “+8V protection” happen at the same time, measure the “+8V”. If this voltage is missing, check transistor 7491 & 7496.
- **Set is non-stop in hiccup mode.** Set is in over current mode; check the secondary sensing (opto coupler 7515) and the “Main Supply” voltage. Signal “Stdby_con” must be logic low under normal operation conditions and goes to high (3.3 V) under standby and fault conditions.
- **Set turns on, but without picture and sound.** The screen shows snow, but OSD and other menus are okay. Blinking LED procedure indicates error 11, so problem is expected in the tuner (pos. 1000). Check presence of supply voltages. As “Vlotaux+5V” at pin 5 and 7 are okay, “VT_supply” at pin 9 is missing. Conclusion: resistor 3449 & 3450 are defective

Personal Notes:

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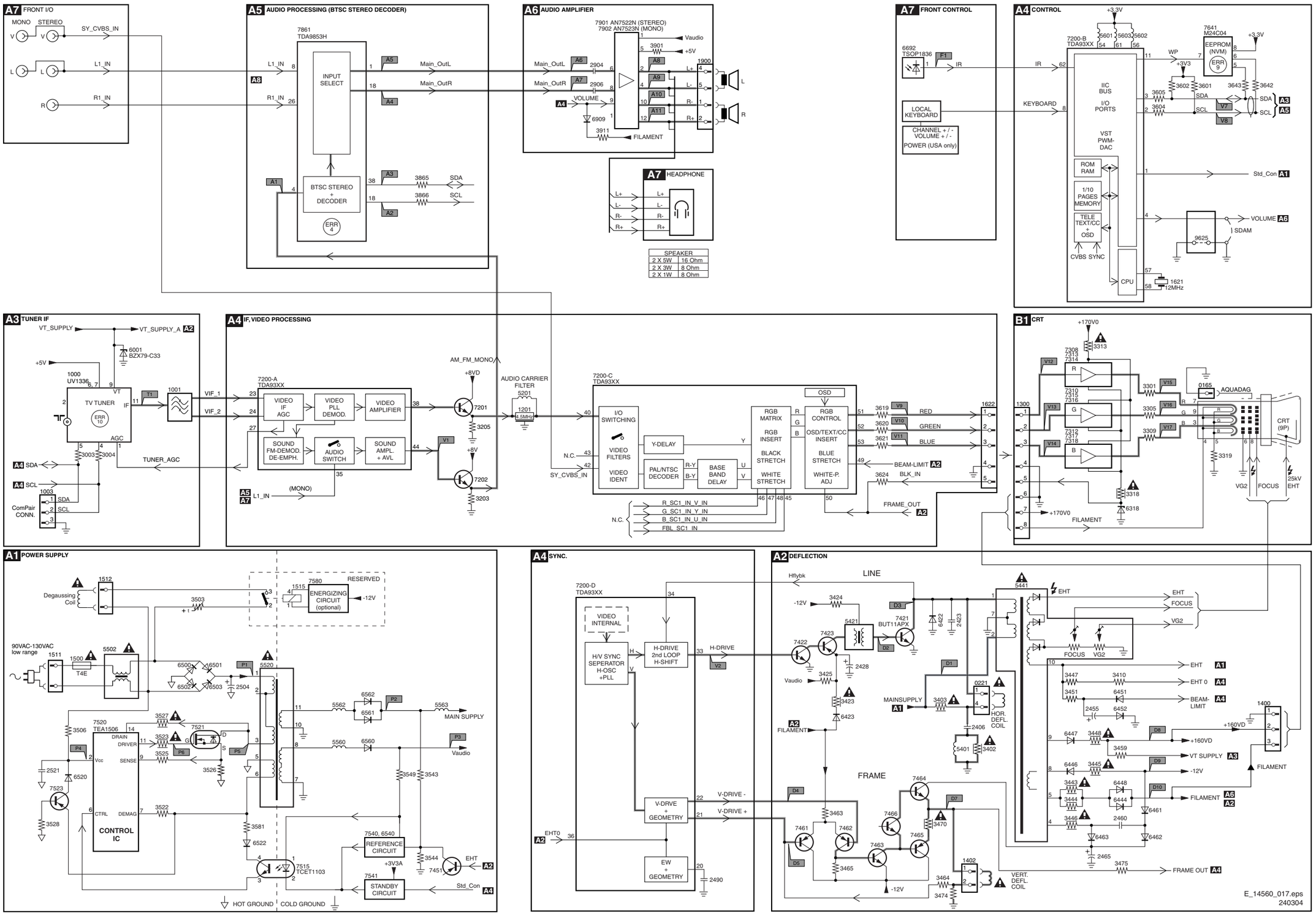
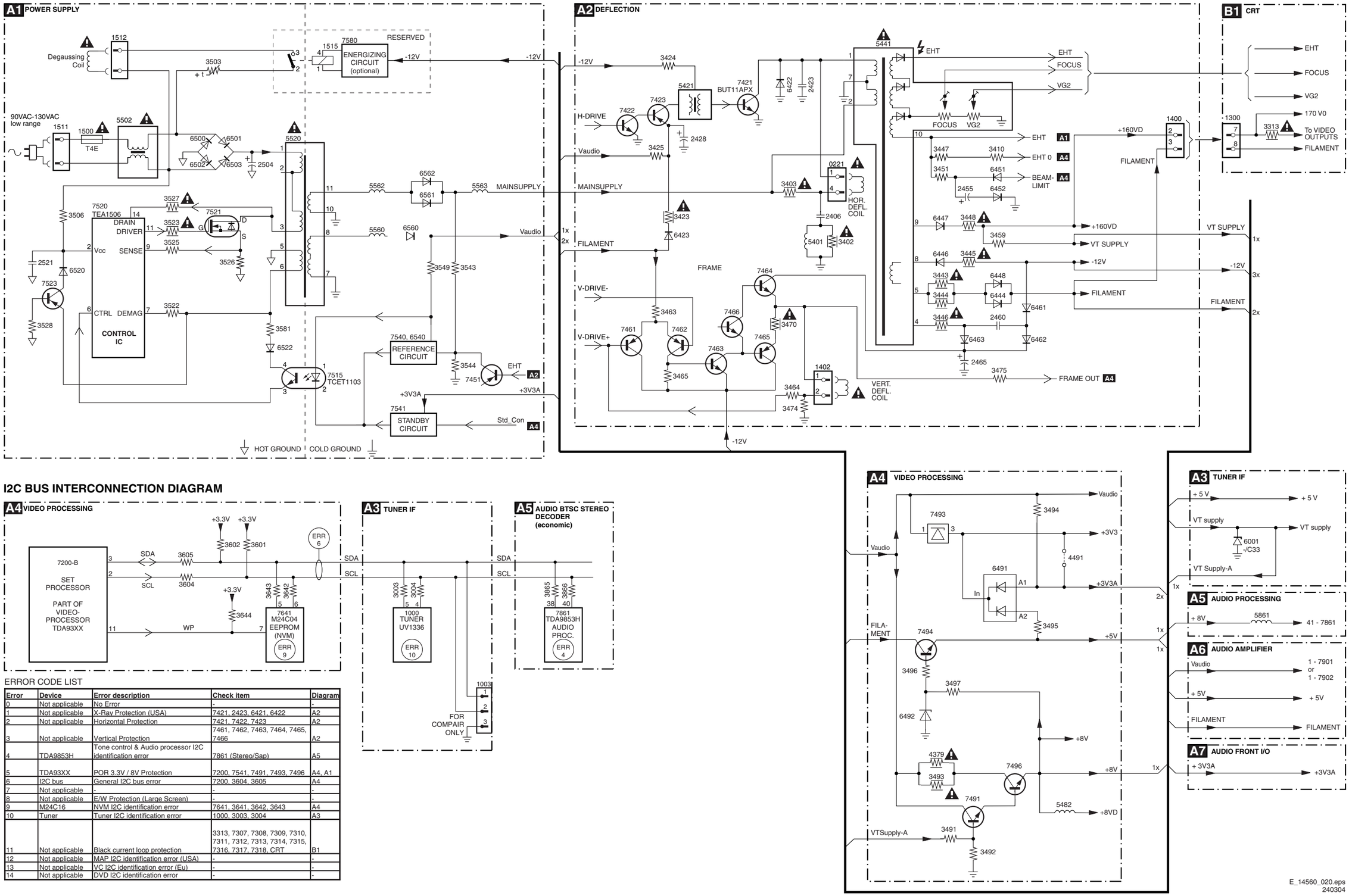
6. Block Diagrams, Testpoint Overviews, and Waveforms

Block Diagram



I²C and Supply Voltage Overview



I2C BUS INTERCONNECTION DIAGRAM

ERROR CODE LIST

Error	Device	Error description	Check item	Diagram
0	Not applicable	No Error	-	-
1	Not applicable	X-Ray Protection (USA)	7421, 2423, 6421, 6422	A2
2	Not applicable	Horizontal Protection	7421, 7422, 7423	A2
3	Not applicable	Vertical Protection	7461, 7462, 7463, 7464, 7465, 7466	A2
4	TDA9853H	Tone control & Audio processor I2C identification error	7861 (Stereo/Sap)	A5
5	TDA93XX	POR 3.3V / 8V Protection	7200, 7541, 7491, 7493, 7496	A4, A1
6	I2C bus	General I2C bus error	7200, 3604, 3605	A4
7	Not applicable	-	-	-
8	Not applicable	E/W Protection (Large Screen)	-	-
9	M24C16	NVM I2C identification error	7641, 3641, 3642, 3643	A4
10	Tuner	Tuner I2C identification error	1000, 3003, 3004	A3
11	Not applicable	Black current loop protection	3313, 7307, 7308, 7309, 7310, 7311, 7312, 7313, 7314, 7315, 7316, 7317, 7318, CRT	B1
12	Not applicable	MAP I2C identification error (USA)	-	-
13	Not applicable	VC I2C identification error (Eu)	-	-
14	Not applicable	DVD I2C identification error	-	-

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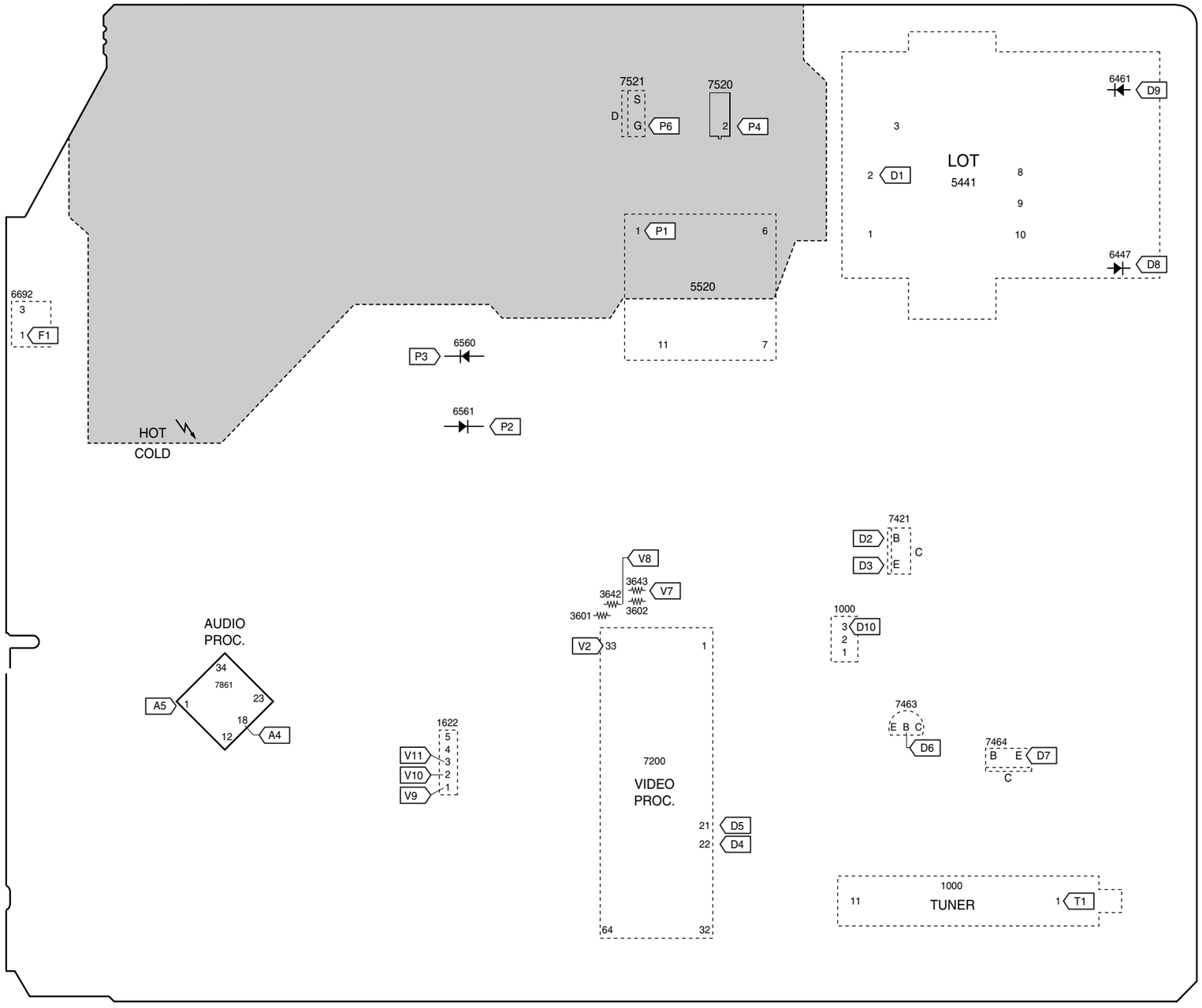
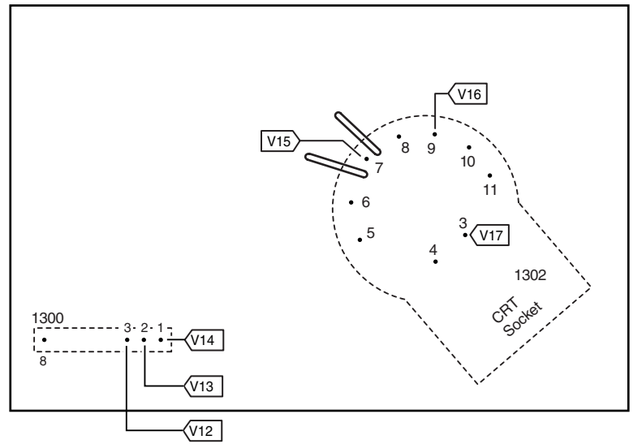
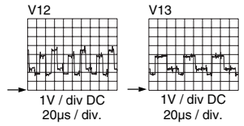
Testpoint Overview Mono Carrier and CRT Panel

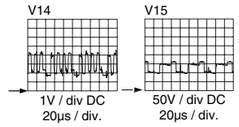
MONO CARRIER TRACK SIDE VIEW

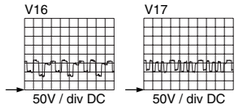


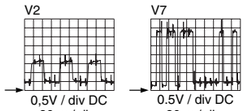
CRT TRACK SIDE VIEW

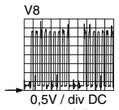


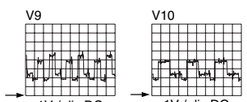


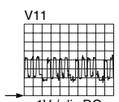


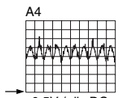


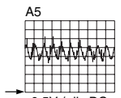




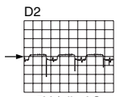


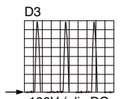


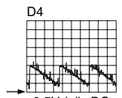


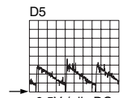


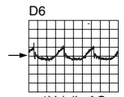
D1 97V DC

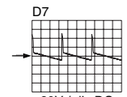


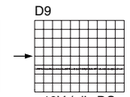


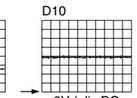


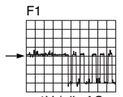


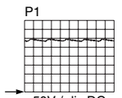




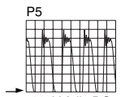


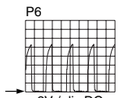


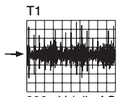




P2 97V DC
P3 13V5 DC
P4 17V8 DC







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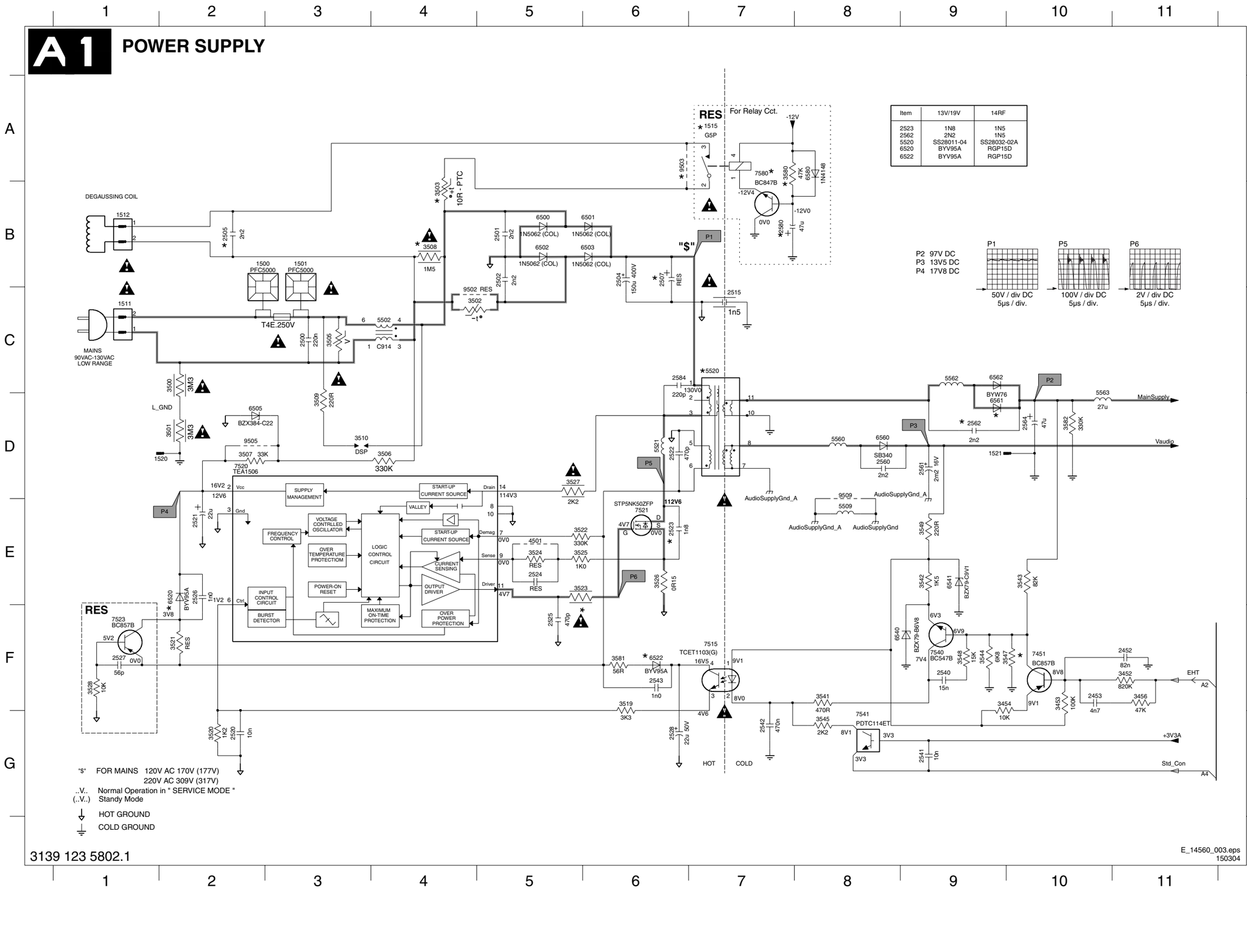
7. Circuit Diagrams and PWB Layouts

Mono Carrier: Power Supply



Item	13V/19V	14RF
2523	1N8	1N5
2562	2N2	1N5
5520	SS28011-04	SS28032-02A
6520	BYV95A	RGP15D
6522	BYV95A	RGP15D

P2 97V DC
P3 13V5 DC
P4 17V8 DC

P1 50V / div DC 5µs / div.
P5 100V / div DC 5µs / div.
P6 2V / div DC 5µs / div.

"$" FOR MAINS 120V AC 170V (177V)
220V AC 309V (317V)
..V.. Normal Operation in " SERVICE MODE "
(..V..) Standy Mode
HOT GROUND
COLD GROUND

3139 123 5802.1

1500 B2
1501 B3
1511 C1
1512 B1
1515 A7
1520 D1
1521 D9
2452 F11
2453 F10
2500 C3
2501 B5
2502 B5
2504 B6
2505 B2
2507 B6
2515 C7
2520 G2
2521 E2
2522 D6
2523 E6
2524 E5
2525 F5
2526 E2
2527 F1
2528 G6
2540 F9
2541 G9
2542 G7
2543 F6
2560 D8
2561 D9
2562 D9
2564 D10
2580 B7
2584 C6
3452 F11
3453 F10
3454 F9
3456 F11
3500 C2
3501 D2
3502 C4
3503 B4
3505 C3
3506 D4
3507 D2
3508 B4
3509 D3
3510 D3
3519 F6
3520 G2
3521 F2
3522 E5
3523 E5
3524 E5
3525 E5
3526 E6
3527 D5
3528 F1
3541 F8
3542 E9
3543 E10
3544 F9
3545 G8
3547 F10
3548 F9
3549 E9
3580 A7
3581 F6
3582 D10
4501 E5
5502 C4
5509 E8
5520 C7
5521 D6
5560 D8
5562 C9
5563 D10
6500 B5
6501 B6
6502 B5
6503 B6
6505 D2
6520 E2
6522 F6
6540 F8
6541 E9
6560 D8
6561 D9
6562 C9
6580 A8
7451 F10
7515 F7
7520 D2
7521 E6
7523 F1
7540 F9
7541 G8
7580 A7
9502 C4
9503 A6
9505 D2
9509 D8

Mono Carrier: Deflection

A2 DEFLECTION

Line Deflection

Item	19V	13V	14RF
3473	3R3	4R7	3R3
3474	3R3	4R7	3R3
2406	NO	NO	360N
2408	560N	560N	NO
2423	15N15N	13N	12N
2424	1N	470P	680P
2441	33N	22N	15N
2452	100N	22N	22N
2494	NO	NO	47U
3402	2K2	NO	2K2
3440	33K	36K	33K
3441	47K	47K	10K
3442	150K	100K	150K
3443	3R9	4R7	3R9
3444	3R9	3R9	4R7
3445	1R	3R9	1R
3447	150K	220K	100K
3451	8K2	680R	680R
3455	2K2	470R	470R
3460	47K	100K	100K
5441	JF0501-19276	JF0501-19255	JF0501-19255

Frame Deflection

D1 97V DC — 5V / div AC, 20µs / div.
D2 — 100V / div DC, 20µs/div.
D3 — 0.5V / div DC, 5ms / div.
D4 — 0.5V / div DC, 5ms / div.
D5 — 1V / div AC, 5ms / div.
D6 — 20V / div DC, 5ms / div.
D7 — 50V / div DC, 20µs / div.
D8 — 10V / div DC, 20µs / div.
D9 — 2V / div DC, 20µs / div.
D10

3139 123 5802.1

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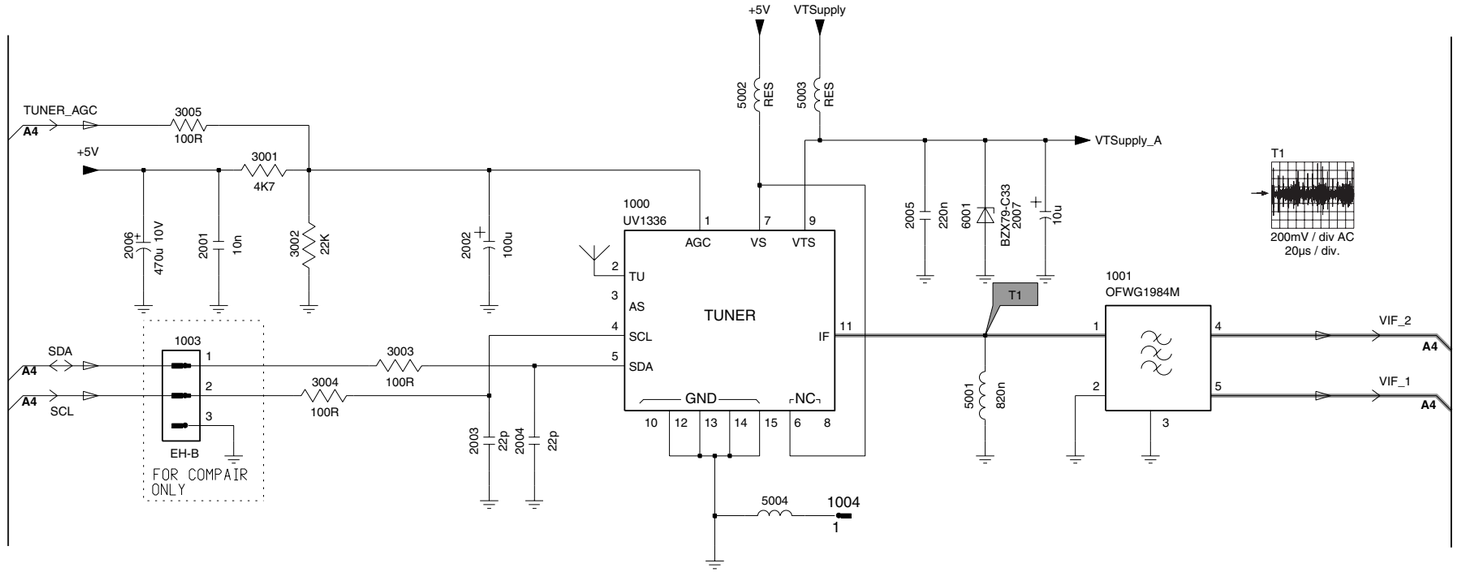
1400 E10
1401 C4
1402 G6
1463 E8
1464 E11
2405 D3
2406 D4
2408 D5
2420 B2
2421 B3
2423 A4
2424 A4
2426 B2
2427 B1
2428 D2
2429 B2
2441 C9
2444 E8
2446 E8
2447 E8
2455 D9
2457 E7
2460 E6
2461 F2
2462 F3
2463 F3
2464 F3
2465 F5
2470 F5
2471 B1
2473 C7
3402 D5
3403 D4
3410 C9
3422 A3
3423 C2
3424 B1
3425 C1
3426 B3
3428 B3
3430 C2
3432 C2
3439 D8
3440 D8
3441 C8
3442 D8
3443 D7
3444 D7
3445 D7
3446 E6
3447 C8
3448 D8
3449 C8
3450 C9
3451 C9
3455 C9
3457 C8
3459 D8
3460 D9
3461 F1
3462 G2
3463 F2
3464 G3
3465 G2
3466 G3
3468 E4
3470 F4
3471 F5
3472 G5
3473 H5
3474 H5
3475 F6
3476 F6
3478 G5
5401 E5
5402 E4
5421 C3
5441 B5
6422 A4
6423 C1
6426 B2
6444 D7
6445 C7
6446 D7
6447 D7
6448 D7
6451 C9
6452 D9
6453 D8
6460 F3
6461 F6
6462 E5
6463 E6
6464 F4
7421 B3
7422 B2
7423 C2
7440 C8
7461 F2
7462 F3
7463 G4
7464 E4
7465 G5
7466 F4
9402 E4

Mono Carrier: Tuner IF

1000 C5
1001 D7
1003 D3
1004 E6
2001 C3
2002 C4
2003 D4
2004 D4
2005 C6
2006 C3
2007 C7
3001 C3
3002 C3
3003 D4
3004 D4
3005 C3
5001 D7
5002 C5
5003 C6
5004 E6
6001 C7

A3 TUNER IF



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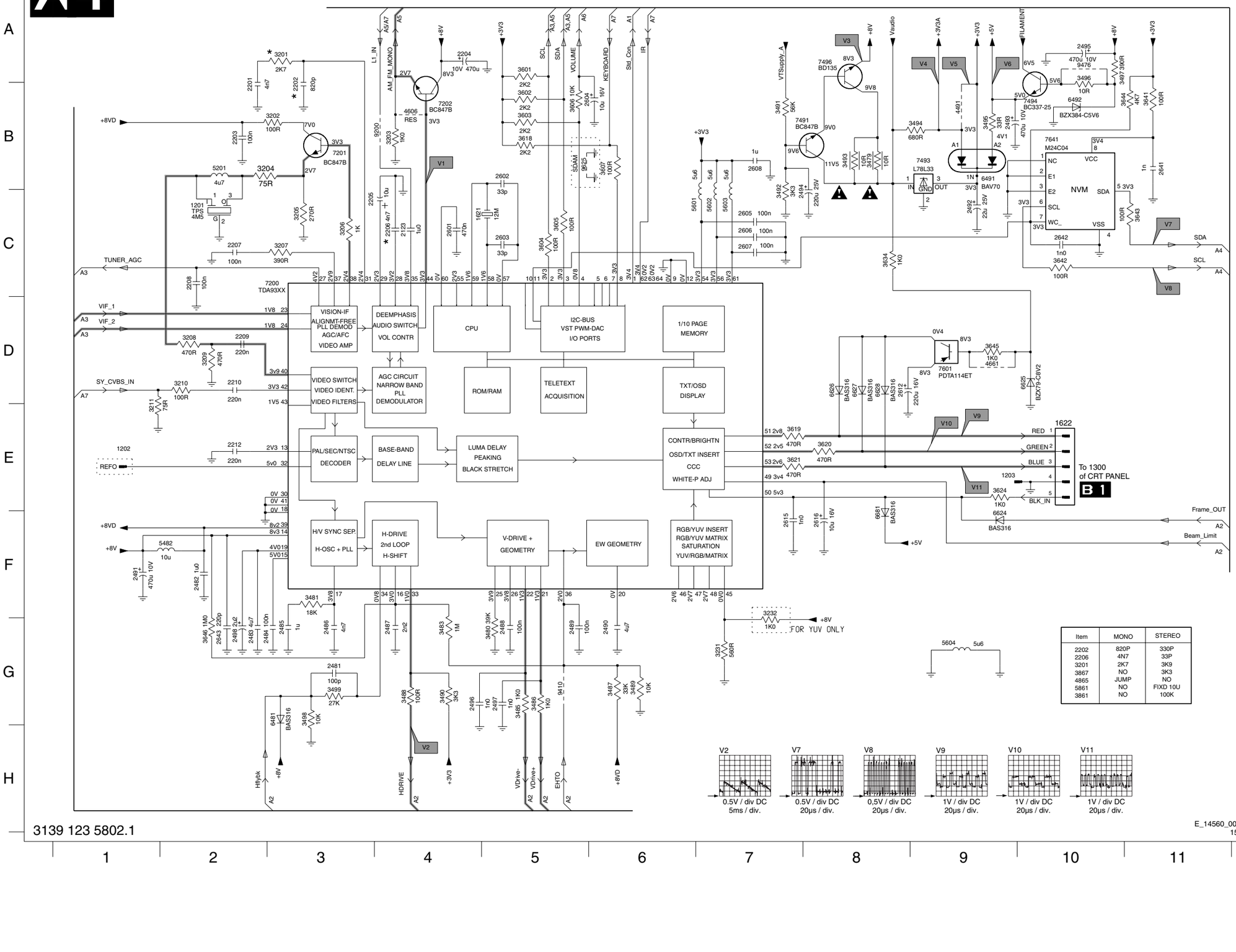
Mono Carrier: IF, Video Processing, Control, and Sync.

A4 VIDEO PROCESSING



Item	MONO	STEREO
2202	820P	330P
2206	4N7	33P
3201	2K7	3K9
3867	NO	3K3
4865	JUMP	NO
5861	NO	FIXD 10U
3861	NO	100K

V2: 0.5V / div DC, 5ms / div.
V7: 0.5V / div DC, 20µs / div.
V8: 0,5V / div DC, 20µs / div.
V9: 1V / div DC, 20µs / div.
V10: 1V / div DC, 20µs / div.
V11: 1V / div DC, 20µs / div.

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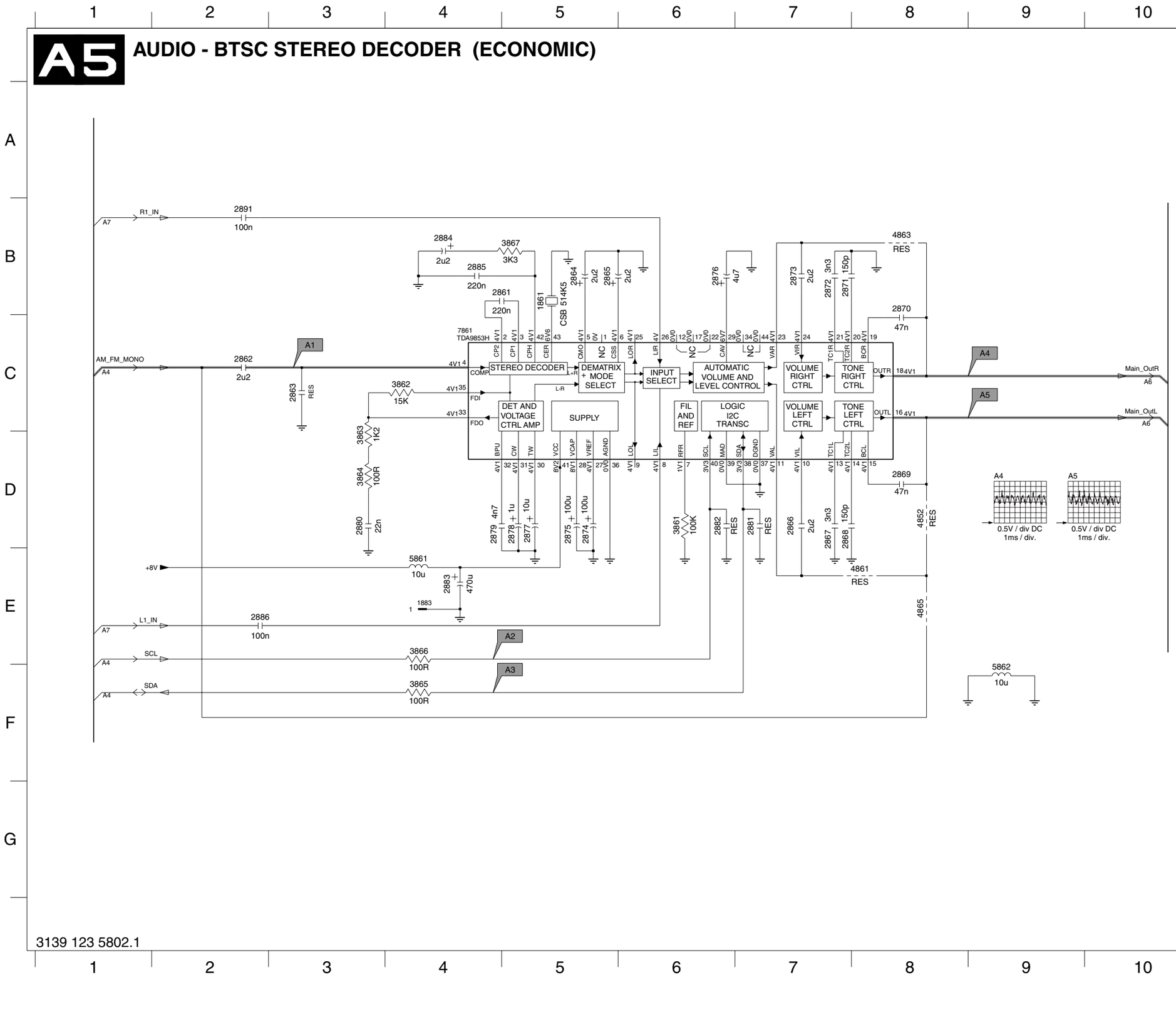
3139 123 5802.1

1201 C2
1202 E1
1203 E9
1621 C4
1622 E10
2123 C4
2201 B2
2202 B3
2203 B2
2204 A4
2205 C3
2206 C4
2207 C2
2208 C2
2209 D2
2210 D2
2212 E2
2481 G3
2482 F2
2483 G2
2484 G3
2485 G3
2486 G3
2487 G4
2488 G5
2489 G5
2490 G6
2491 F1
2492 C9
2493 B9
2494 C8
2495 A10
2496 G4
2497 G5
2498 G2
2601 C4
2602 B5
2603 C5
2604 B6
2605 C7
2606 C7
2607 C7
2608 B7
2612 D8
2615 F7
2616 F8
2641 B11
2642 C10
2643 G2
3201 A3
3202 B3
3203 B4
3204 B2
3205 C3
3206 C3
3207 C3
3208 D2
3209 D2
3210 D2
3211 E1
3231 G7
3232 F7
3479 B8
3480 G5
3481 F3
3483 G4
3485 G5
3486 G5
3487 G6
3488 G4
3489 G6
3490 G4
3491 B7
3492 C7
3493 B8
3494 B9
3495 B9
3496 A10
3497 A10
3498 G3
3499 G3
3601 A5
3602 B5
3603 B5
3604 C5
3605 C5
3606 B5
3607 B6
3618 B5
3619 E7
3620 E8
3621 E7
3624 E9
3634 C8
3641 B11
3642 C10
3643 C11
3644 B11
3645 D9
3646 G2
4491 B9
4606 B4
4661 D9
5201 B2
5482 F2
5601 C7
5602 C7
5603 C7
5604 G9
6481 G3
6491 B9
6492 B10
6624 F9
6625 D10
6626 D8
6627 D8
6628 D8
6681 F8
7200 C3
7201 B3
7202 B4
7491 B7
7493 B9
7494 B10
7496 A8
7601 D9
7641 B10
9200 B4
9410 G5
9476 A10

Mono Carrier: Audio - BTSC Stereo Decoder (Economic)

A5 AUDIO - BTSC STEREO DECODER (ECONOMIC)



1861 B5
1883 E4
2861 B4
2862 C2
2863 C3
2864 B5
2865 B5
2866 D7
2867 D7
2868 D7
2869 D8
2870 B8
2871 B7
2872 B7
2873 B7
2874 D5
2875 D5
2876 B6
2877 D5
2878 D5
2879 D4
2880 D3
2881 D7
2882 D6
2883 E4
2884 B4
2885 B4
2886 E2
2891 B2
3861 D6
3862 C4
3863 D3
3864 D3
3865 F4
3866 E4
3867 B5
4852 D8
4861 E8
4863 B8
4865 E8
5861 E4
5862 F9
7861 C4

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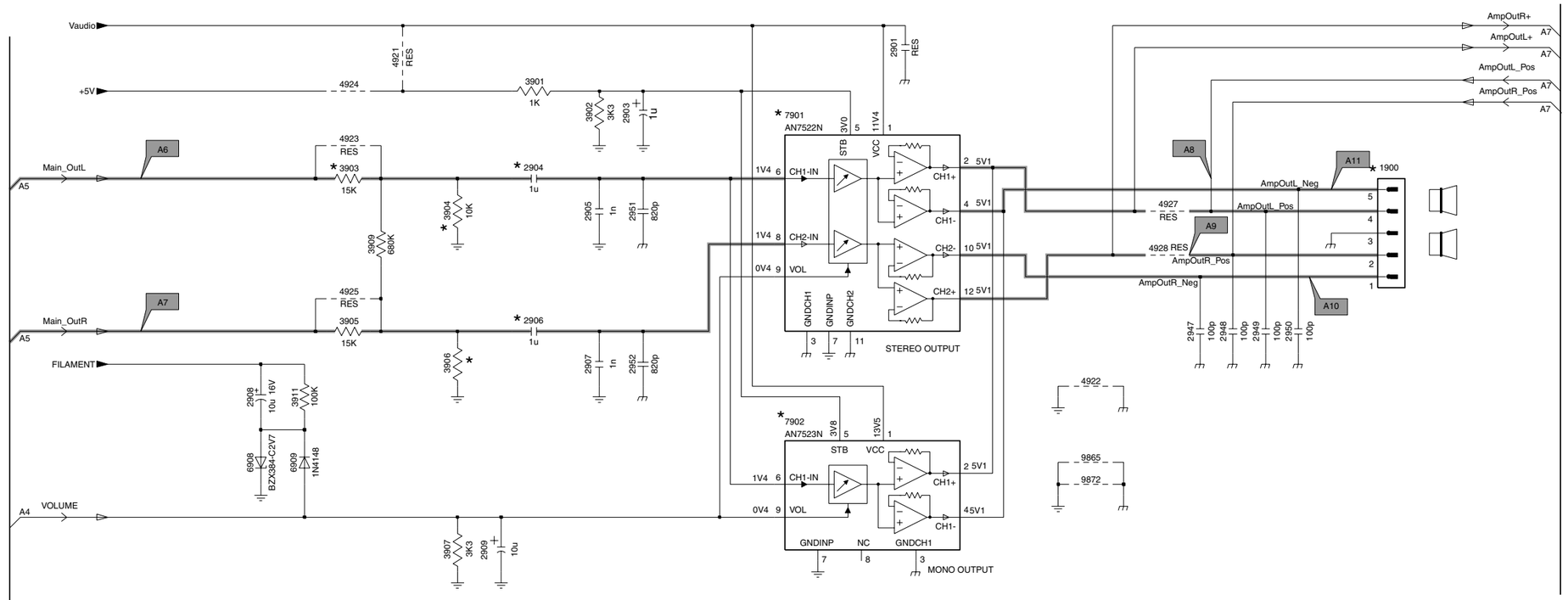
Mono Carrier: Audio Amplifier + Mono Sound Processing

A6 AUDIO_AMPLIFIER + MONO_SOUND_PROCESSING



Item	1x1W	2x1W	2x3W
1900	3PIN	5PIN	5PIN
2904	1U	470N	47N
2906	NO	470N	47N
3903	4K7	3K3	3K3
3904	2K7	10K	10K
7901	NO	AN7522	AN7522
7902	AN7523	NO	NO

1900 B10
2901 A7
2903 B5
2904 B4
2905 B5
2906 C4
2907 C5
2908 D3
2909 E4
2947 C9
2948 C9
2949 C9
2950 C9
2951 B5
2952 C5
3901 B4
3902 B5
3903 B3
3904 B4
3905 C3
3906 C4
3907 E4
3909 C3
3911 D3
4921 A4
4922 C8
4923 B3
4924 B3
4925 C3
4927 B9
4928 C9
6908 D3
6909 D3
7901 B6
7902 D6
9865 D8
9872 D8

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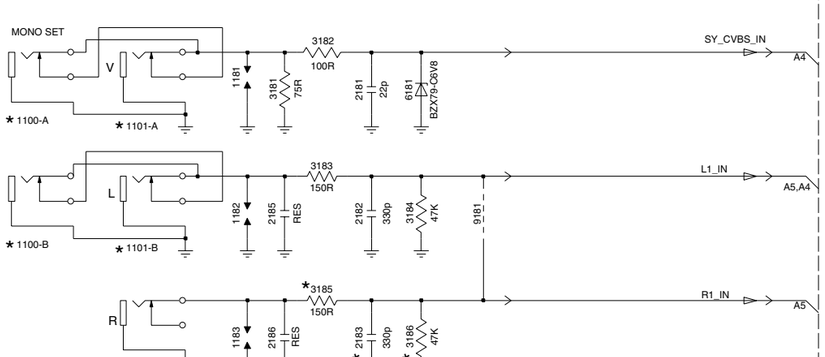
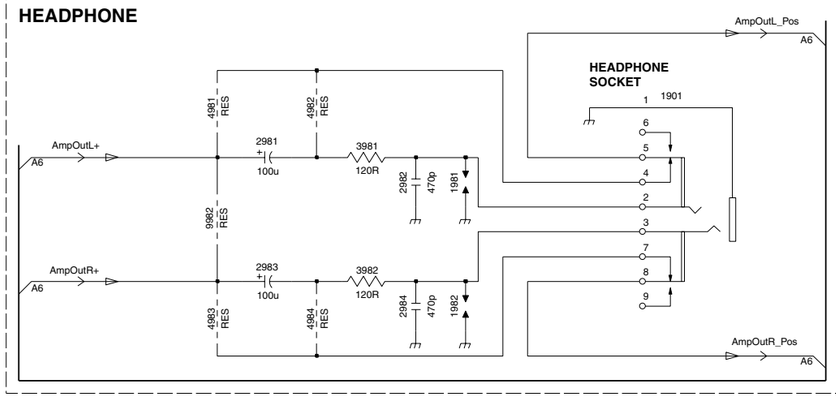
Mono Carrier: Front I/O + Front Control + Headphone

A7 FRONT IO + FRONT CONTROL + HEADPHONE

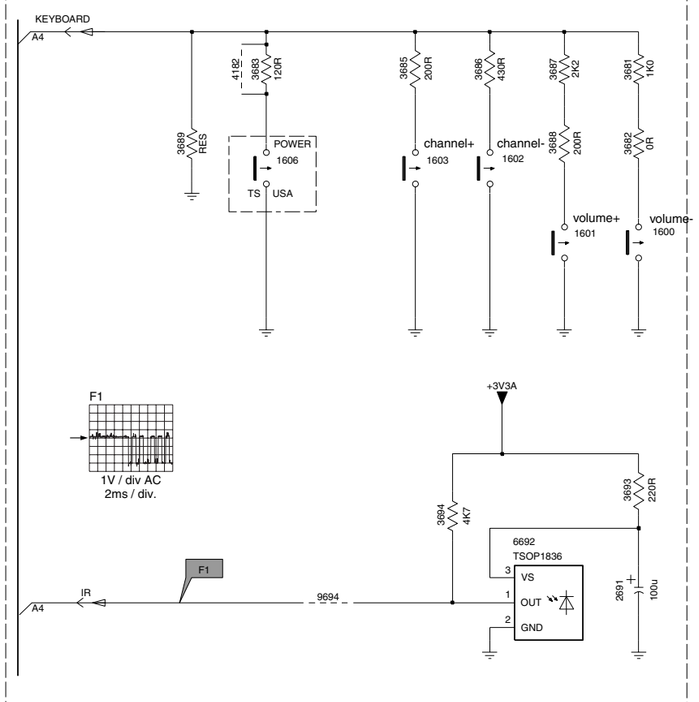
FRONT CINCH



HEADPHONE



FRONT CONTROL



For Engg Purpose Only

4694

Item	Stereo	Mono
1100	3PIN	2PIN
2123	NO	1U
2183	33P	NO
3185	150R	NO
3186	47R	NO

1100-A B1
1100-B C1
1101-A B2
1101-B C2
1101-C D2
1181 B3
1182 C3
1183 C3
1600 C10
1601 C9
1602 B9
1603 B9
1606 B8
1901 E5
1981 F4
1982 F4
2181 B3
2182 C3
2183 C3
2185 C3
2186 C3
2691 E10
2981 F2
2982 F3
2983 F2
2984 F3
3181 B3
3182 B3
3183 B3
3184 C4
3185 C3
3186 C4
3681 B10
3682 B10
3683 B8
3685 B8
3686 B9
3687 B9
3688 B9
3689 B7
3693 D10
3694 D9
3981 F3
3982 F3
4182 B7
4694 G7
4981 E2
4982 E3
4983 G2
4984 G3
6181 B4
6692 E9
9181 C4
9694 E8
9982 F2

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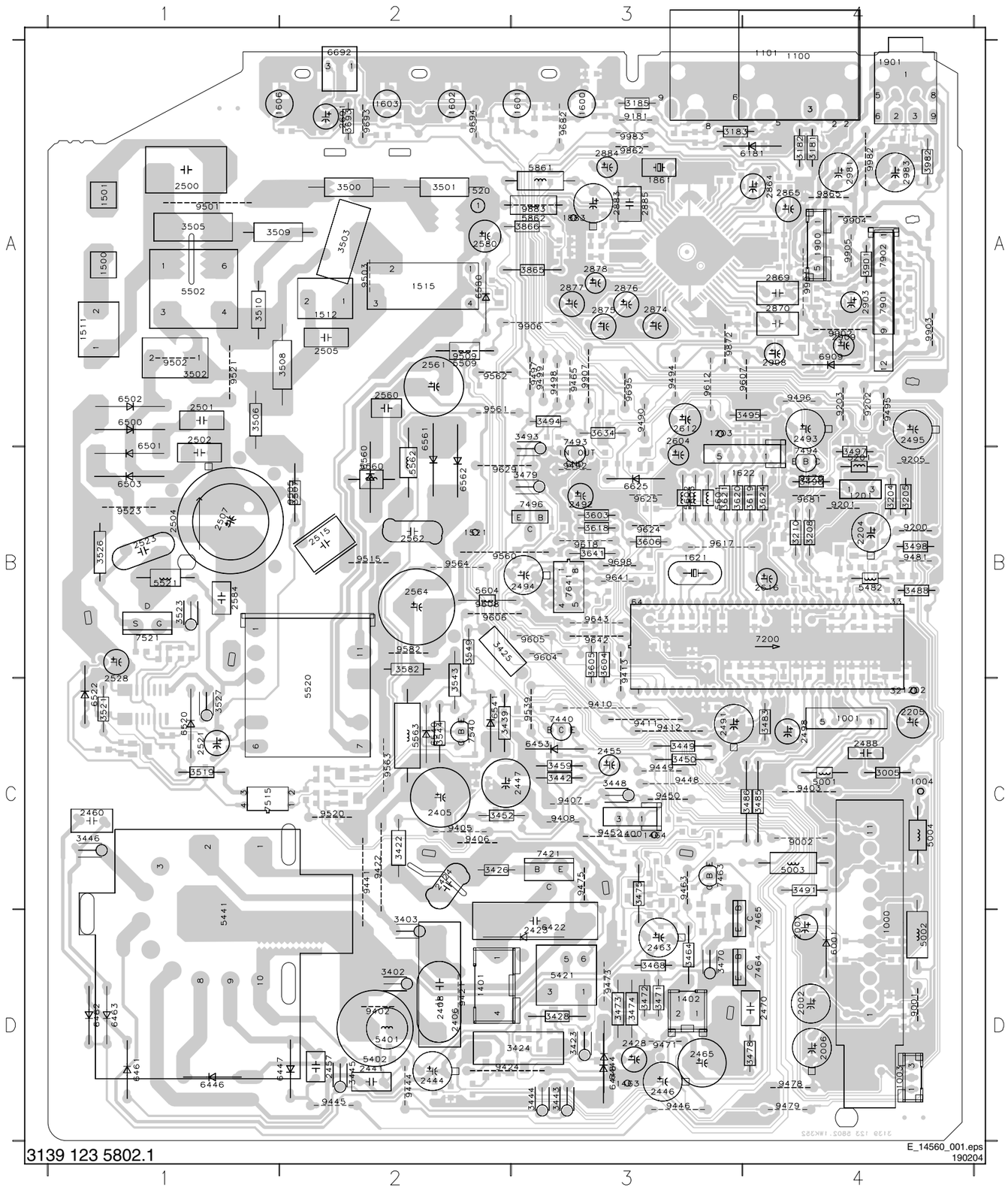
Layout Mono Carrier (Top Side)



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1000	D4	3208	B4	6446	D1	9612	A3				
1001	C4	3210	B4	6447	D2	9617	B3				
1003	D4	3402	D2	6448	D3	9618	B3				
1004	C4	3403	D2	6453	C3	9624	B3				
1100	A4	3422	C2	6461	D1	9625	B3				
1101	A4	3423	D3	6462	D1	9629	B2				
1201	B4	3424	D3	6463	D1	9641	B3				
1202	C4	3425	B2	6500	A1	9642	B3				
1203	A3	3426	C2	6501	A1	9643	B3				
1400	C3	3428	D3	6502	A1	9681	B4				
1401	D2	3439	C2	6503	B1	9682	A3				
1402	D3	3442	C3	6520	C1	9693	A2				
1463	D3	3443	D3	6522	C1	9694	A2				
1464	C3	3444	D3	6540	C2	9695	A3				
1500	A1	3445	D2	6541	C2	9698	B3				
1501	A1	3446	C1	6560	B2	9862	A3				
1511	A1	3448	C3	6561	A2	9865	A4				
1512	A2	3449	C3	6562	B2	9872	A3				
1515	A2	3450	C3	6580	A2	9883	A3				
1520	A2	3452	C2	6625	B3	9901	A4				
1521	B2	3459	C3	6692	A2	9902	A4				
1600	A3	3464	D3	6909	A4	9903	A4				
1601	A3	3468	D3	7200	B4	9904	A4				
1602	A2	3470	D3	7421	C3	9905	A4				
1603	A2	3471	D3	7440	C3	9906	A3				
1606	A1	3472	D3	7463	C3	9907	A3				
1621	B3	3473	D3	7464	D4	9982	A4				
1622	B4	3474	D3	7465	D4	9983	A3				
1861	A3	3475	C3	7493	A3						
1883	A3	3478	D4	7494	B4						
1900	A4	3479	B3	7496	B3						
1901	A4	3483	C4	7515	C1						
2002	D4	3485	C4	7521	B1						
2006	D4	3486	C4	7540	C2						
2007	D4	3488	B4	7641	B3						
2204	B4	3491	C4	7901	A4						
2205	C4	3493	A3	7902	A4						
2405	C2	3494	A3	9001	D4						
2406	D2	3495	A4	9002	C4						
2408	D2	3496	B4	9181	A3						
2423	D3	3497	B4	9200	B4						
2424	C2	3498	B4	9201	B4						
2428	D3	3500	A2	9202	A4						
2441	D2	3501	A2	9203	A4						
2444	D2	3502	A1	9205	B4						
2446	D3	3503	A2	9402	D2						
2447	C3	3505	A1	9403	C4						
2455	C3	3506	A1	9405	C2						
2457	D2	3507	B2	9406	C2						
2460	C1	3508	A2	9407	C3						
2463	D3	3509	A1	9408	C3						
2465	D3	3510	A1	9410	C3						
2470	D4	3519	C1	9411	C3						
2488	C4	3521	C1	9412	C3						
2491	C3	3523	B1	9413	B3						
2492	B3	3526	B1	9421	D2						
2493	A4	3527	C1	9422	C2						
2494	B3	3543	C2	9424	D2						
2495	A4	3544	C2	9441	C2						
2498	C4	3549	B2	9444	D2						
2500	A1	3582	B2	9445	D2						
2501	A1	3603	B3	9446	D3						
2502	A1	3604	B3	9448	C3						
2504	B1	3605	B3	9449	C3						
2505	A2	3606	B3	9450	C3						
2507	B1	3618	B3	9452	C3						
2515	B2	3619	B4	9463	C3						
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2523	B1	3621	B3	9471	D3						
2528	C1	3624	B4	9473	D3						
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2561	A2	3641	B3	9476	B4						
2562	B2	3693	A2	9478	D4						
2564	B2	3865	A3	9479	D4						
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2584	B1	3901	A4	9490	A3						
2604	A3	3982	A4	9492	B3						
2612	A3	5001	C4	9494	A3						
2616	B4	5002	D4	9495	A4						
2691	A2	5003	C4	9496	A4						
2864	A4	5004	C4	9497	A3						
2865	A4	5201	B4	9498	A3						
2869	A4	5401	D2	9499	A3						
2870	A4	5402	D2	9501	A1						
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2875	A3	5441	D1	9503	A2						
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2877	A3	5502	A1	9509	A2						
2878	A3	5509	A2	9515	B2						
2883	A3	5520	C2	9520	C2						
2884	A3	5521	B1	9521	A1						
2885	A3	5560	B2	9523	B1						
2903	A4	5562	B2	9539	C3						
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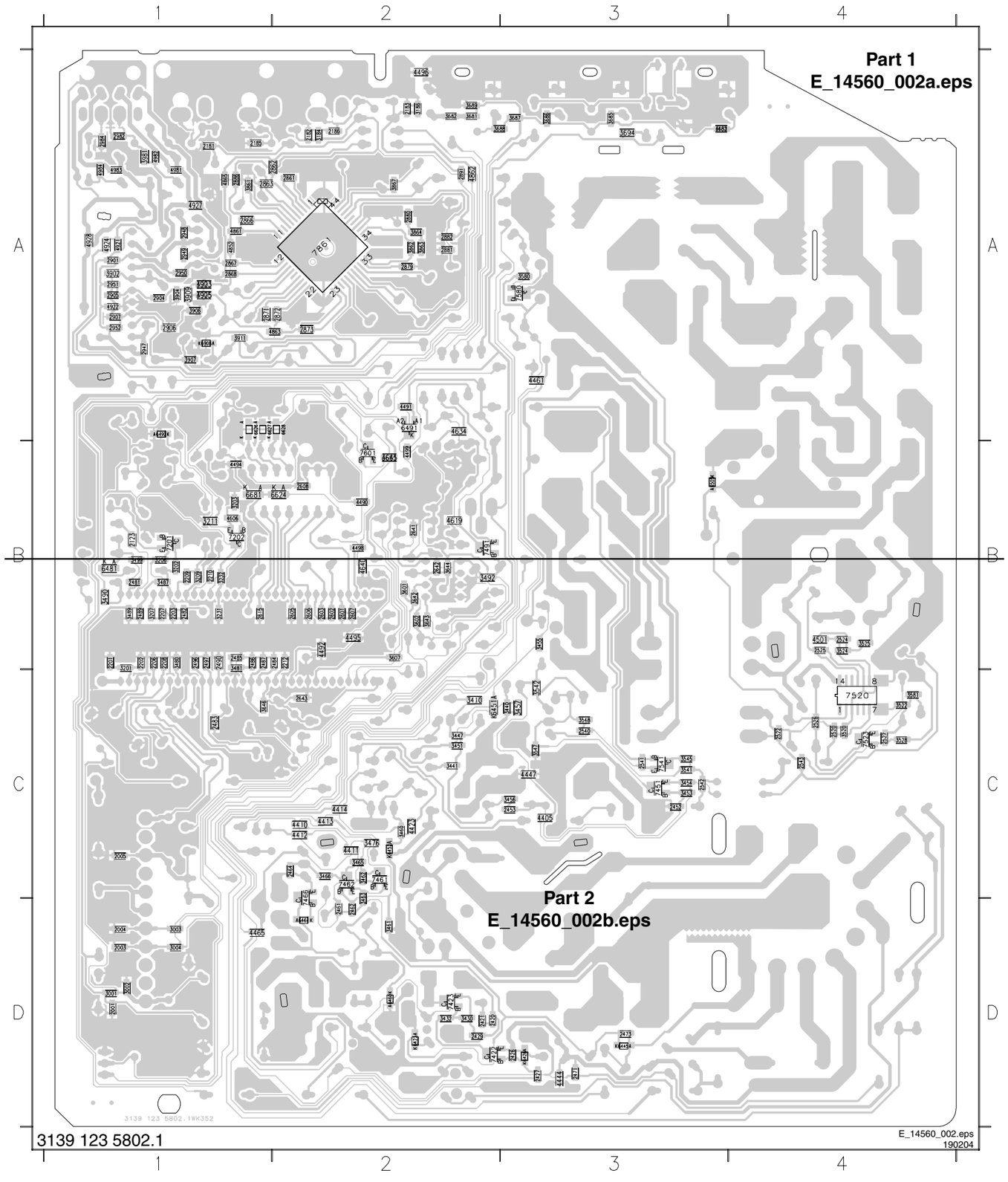
2909	A4	5601	B3	9561	A2						
2981	A4	5602	B3	9562	A2						
2983	A4	5603	B3	9563	C2						
3005	C4	5604	B2	9564	B2						
3181	A4	5861	A3	9582	B2						
3182	A4	5862	A3	9604	B3						
3183	A3	6001	D4	9605	B3						
3185	A3	6181	A4	9606	B2						
3204	B4	6422	D3	9607	A4						
3205	B4	6444	D3	9608	B2						

Layout Mono Carrier (Overview Bottom Side)



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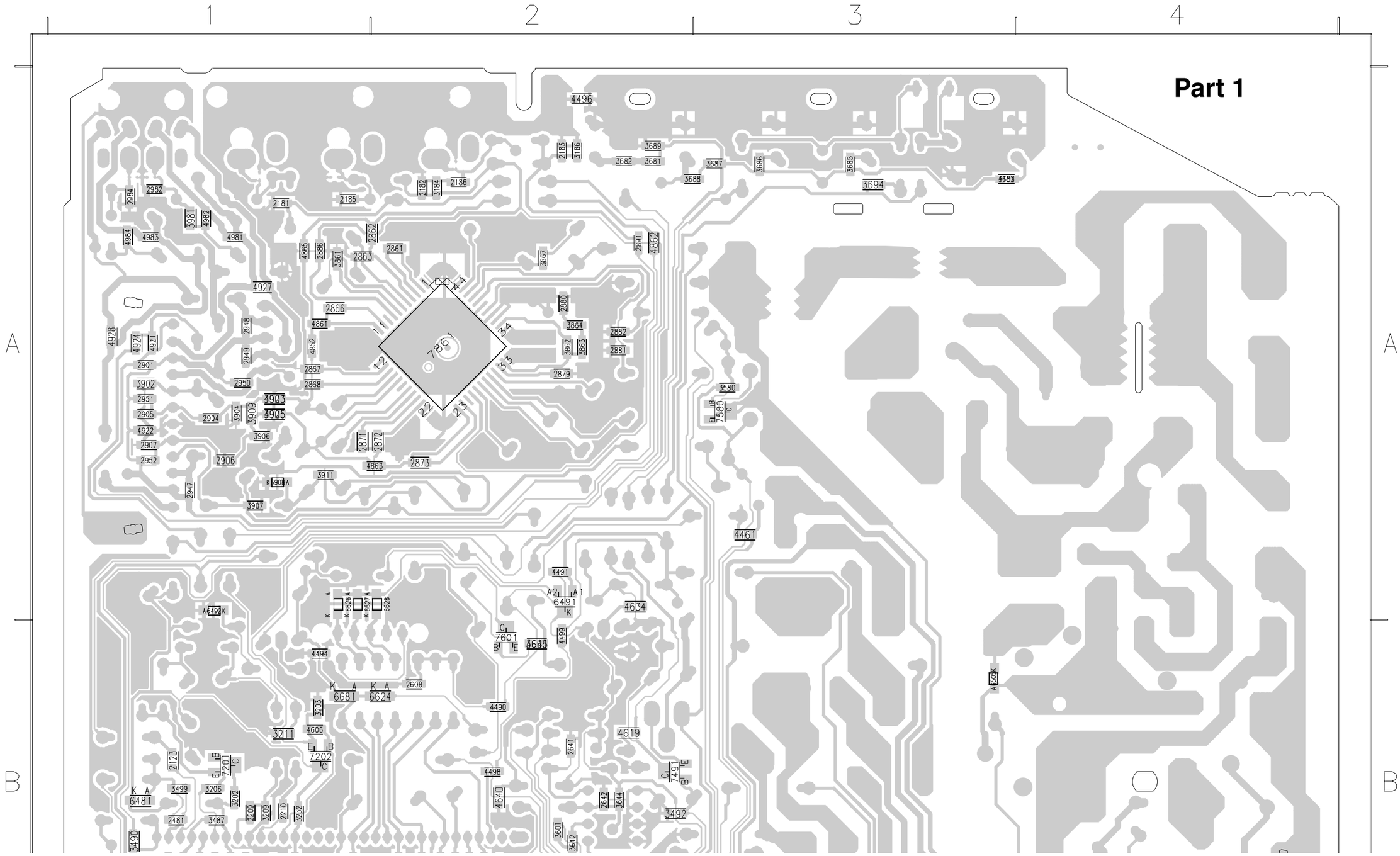
2004	D1	3410	C2	4925	A1		
2005	C1	3430	D2	4927	A1		
2123	B1	3432	D2	4928	A1		
2181	A1	3440	C3	4981	A1		
2182	A2	3441	C2	4982	A1		
2183	A2	3447	C2	4983	A1		
2185	A1	3451	C2	4984	A1		
2186	A2	3453	C3	6423	D2		
2201	B1	3454	C3	6426	D3		
2202	B1	3455	B3	6445	D3		
2203	B1	3456	C3	6451	C2		
2206	B1	3457	C3	6452	C2		
2207	B1	3460	C2	6460	D2		
2208	B1	3461	D2	6464	D2		
2209	B1	3462	C2	6481	B1		
2210	B1	3463	D2	6491	A2		
2212	B2	3465	C2	6492	A1		
2420	D2	3466	C2	6505	B3		
2421	D2	3476	C2	6624	B2		
2426	D3	3480	B1	6626	A1		
2427	D3	3481	B1	6627	A1		
2429	D2	3487	B1	6628	A2		
2452	C3	3489	B1	6681	B1		
2453	C3	3490	B1	6908	A1		
2461	D2	3492	B2	7201	B1		
2462	D2	3499	B1	7202	B1		
2464	C2	3520	C4	7422	D2		
2471	D3	3522	C4	7423	D2		
2473	D3	3524	B4	7451	C3		
2481	B1	3525	B4	7461	C2		
2482	B1	3528	C4	7462	C2		
2483	C1	3541	C3	7466	C2		
2484	B2	3542	C3	7491	B2		
2485	B1	3545	C3	7520	C4		
2486	B1	3547	C3	7523	C4		
2487	B1	3548	C3	7541	C3		
2489	B1	3580	A3	7580	A3		
2490	B1	3581	C4	7601	B2		
2496	B1	3601	B2	7861	A2		
2497	B1	3602	B2				
2520	C4	3607	B2				
2522	C4	3642	B2				
2524	B4	3643	B2				
2525	B4	3644	B2				
2526	C4	3645	B2				
2527	C4	3646	C1				
2540	C3	3681	A2				
2541	C3	3682	A2				
2542	C3	3683	A3				
2543	C4	3685	A3				
2601	B2	3686	A3				
2602	B2	3687	A3				
2603	B2	3688	A2				
2605	B2	3689	A2				
2606	B2	3694	A3				
2607	B2	3861	A1				
2608	B2	3862	A2				
2615	B1	3863	A2				
2641	B2	3864	A2				
2642	B2	3867	A2				
2643	C2	3902	A1				
2861	A2	3903	A1				
2862	A2	3904	A1				
2863	A1	3905	A1				
2866	A1	3906	A1				
2867	A1	3907	A1				
2868	A1	3909	A1				
2871	A1	3911	A1				
2872	A2	3981	A1				
2873	A2	4182	A3				
2879	A2	4405	C3				
2880	A2	4410	C2				
2881	A2	4411	C2				
2882	A2	4412	C2				
2886	A1	4413	C2				
2891	A2	4414	C2				
2901	A1	4423	C2				
2904	A1	4444	D3				
2905	A1	4447	C3				
2906	A1	4461	A3				
2907	A1	4465	D1				
2947	A1	4490	B2				
2948	A1	4491	A2				
2949	A1	4492	B2				
2950	A1	4494	B1				
2951	A1	4495	B2				
2952	A1	4496	A2				
2982	A1	4498	B2				
2984	A1	4499	B2				
3001	D1	4501	B4				
3002	D1	4606	B1				
3003	D1	4619	B2				
3004	D1	4634	A2				
3184	A2	4640	B2				
3186	A2	4661	B2				
3201	B1	4852	A1				
3202	B1	4861	A1				
3203	B1	4862	A2				
3206	B1	4863	A2				
3207	B1	4865	A1				
3209	B1	4921	A1				
3211	B1	4922	A1				

Layout Mono Carrier (Part 1 Bottom Side)



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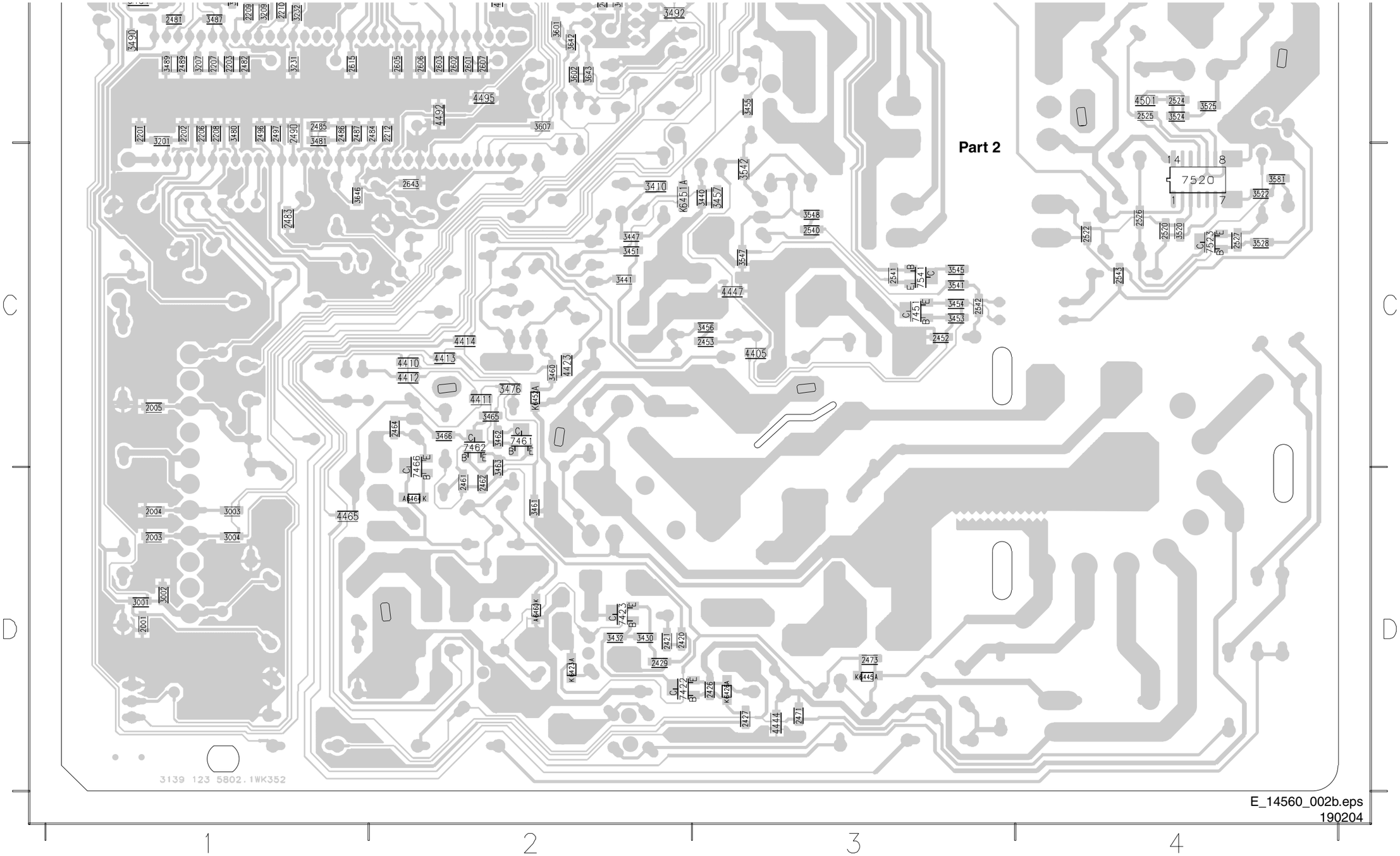
Layout Mono Carrier (Part 2 Bottom Side)



CRT Panel

B1 CRT PANEL

Item	13v/19v	20v	14RF
3311	330R	390R	330R
4303	NO	JUMP	NO
4304	JUMP	NO	JUMP
4305	JUMP	NO	JUMP
4306	NO	JUMP	NO

CRT	9 Pin	12 Pin
GND	Pin 1	Pin 1 & 12
VG1	Pin 6	Pin 5
Green	Pin 9	Pin 6
VG2	Pin 8	Pin 7
Red	Pin 7	Pin 8
Heater	Pin 5	Pin 9
Heater	Pin 4	Pin 10
Blue	Pin 3	Pin 11

V12 1V / div DC 20µs / div.
V13 1V / div DC 20µs / div.
V14 1V / div DC 20µs / div.
V15 50V / div DC 20µs / div.
V16 50V / div DC 20µs / div.
V17 50V / div DC 20µs / div.

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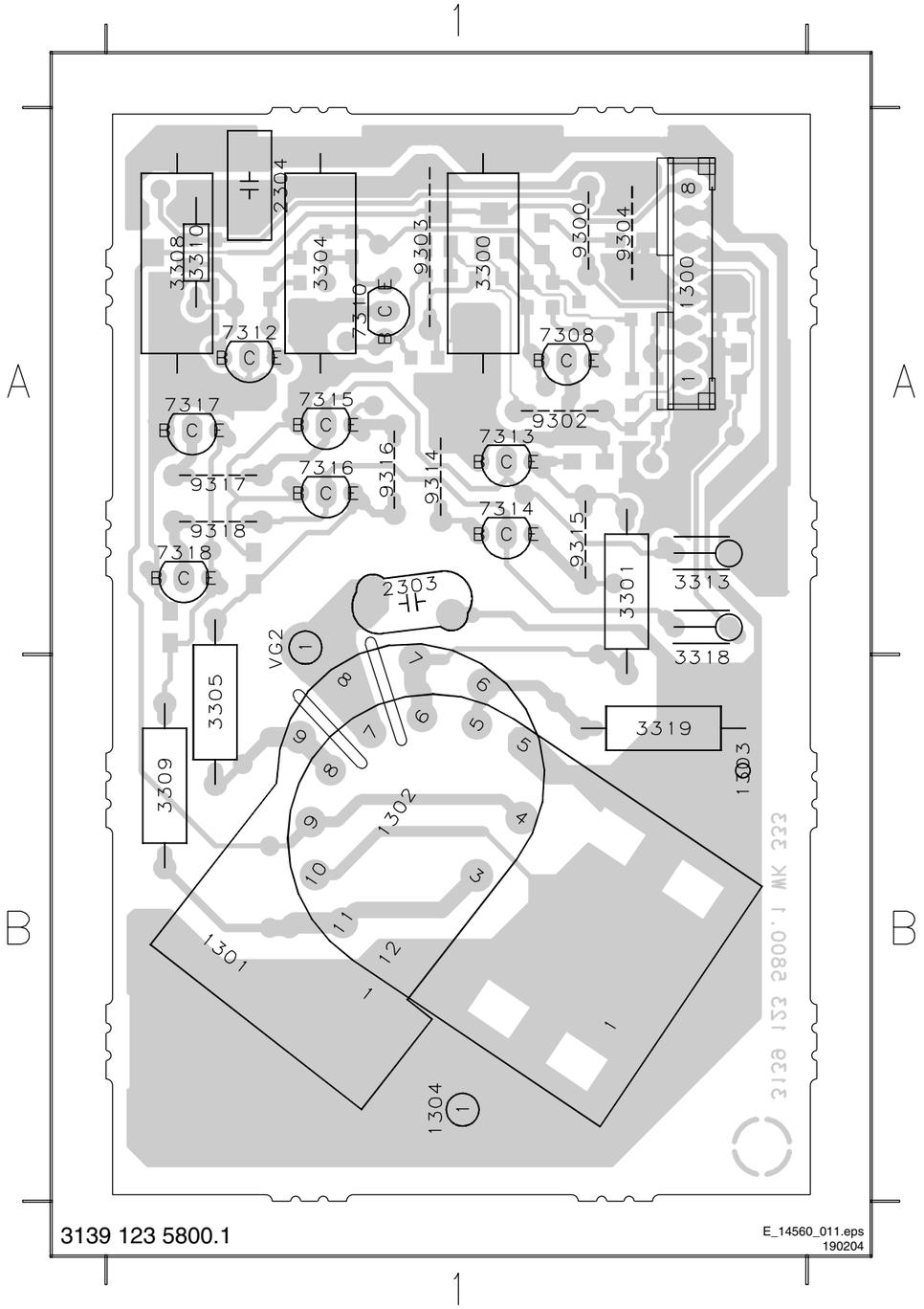
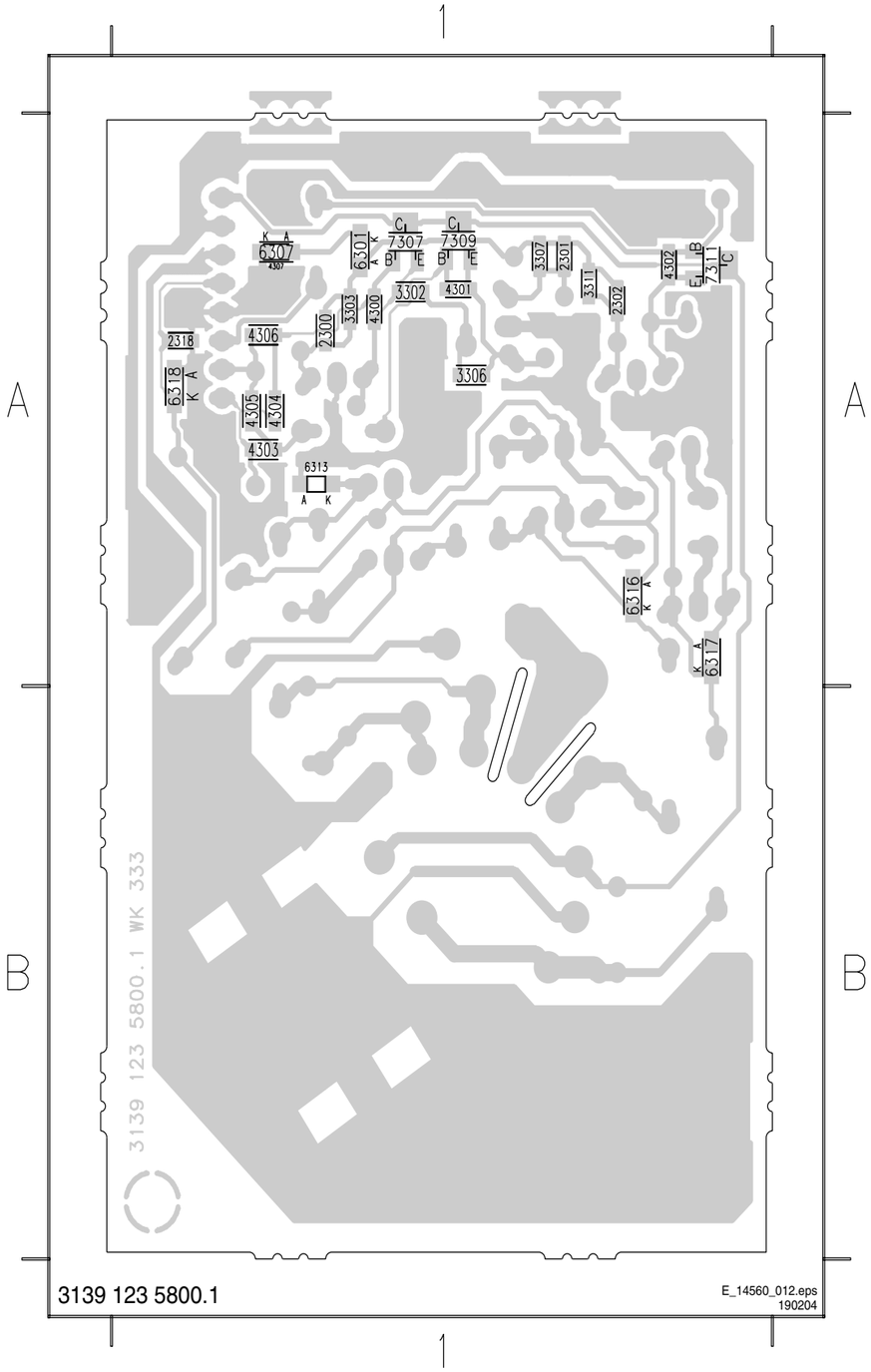
VG2 E9
1300 B1
1301-1 A7
1302-A C7
1303 A7
1304 A7
2300 B3
2301 C4
2302 D4
2303 E2
2304 E1
2318 E4
3300 A3
3301 B5
3302 A2
3303 B3
3304 B4
3305 C5
3306 C2
3307 C3
3308 C4
3309 C5
3310 D2
3311 D4
3313 A4
3318 D4
3319 E6
4300 B2
4301 C2
4302 D2
4303 B1
4304 B1
4305 B1
4306 B1
4307 E2
6301 E3
6307 E2
6313 A4
6316 B4
6317 C4
6318 E4
7307 B3
7308 B3
7309 C3
7310 B3
7311 D3
7312 D4
7313 A4
7314 B4
7315 B4
7316 C4
7317 C4
7318 D5

Layout CRT Panel (Top Side)



VG2 A1
1300 A1
1301 B1
1302 B1
1303 B1
1304 B1
2303 A1
2304 A1
3300 A1
3301 A1
3304 A1
3305 B1
3308 A1
3309 B1
3310 A1
3313 A1
3318 B1
3319 B1
7308 A1
7310 A1
7312 A1
7313 A1
7314 A1
7315 A1
7316 A1
7317 A1
7318 A1
9300 A1
9302 A1
9303 A1
9304 A1
9314 A1
9315 A1
9316 A1
9317 A1
9318 A1

Layout CRT Panel (Bottom Side)



2001 D1
2003 D1
2004 D1
2005 C1
2123 B1
2181 A1
2182 A2
2183 A2
2185 A1
2186 A2
2201 B1
2202 B1
2203 B1
2206 B1
2207 B1
2208 B1
2209 B1
2210 B1
2212 B2
2420 D2
2421 D2
2426 D3
2427 D3
2429 D2
2452 C3
2453 C3
2461 D2
2462 D2
2464 C2
2471 D3
2473 D3
2481 B1
2482 B1
2483 C1
2484 B2
2485 B1
2486 B1
2487 B1
2489 B1
2490 B1
2496 B1
2497 B1
2520 C4
2522 C4
2524 B4
2525 B4
2526 C4
2527 C4
2540 C3
2541 C3
2542 C3
2543 C4
2601 B2
2602 B2
2603 B2
2605 B2
2606 B2
2607 B2
2608 B2
2615 B1
2641 B2
2642 B2
2643 C2
2861 A2
2862 A2
2863 A1
2866 A1
2867 A1
2868 A1
2871 A1
2872 A2
2873 A2
2879 A2
2880 A2
2881 A2
2882 A2
2886 A1
2891 A2
2901 A1
2904 A1
2905 A1
2906 A1
2907 A1
2947 A1
2948 A1
2949 A1
2950 A1
2951 A1
2952 A1
2982 A1
2984 A1
3001 D1
3002 D1
3003 D1
3004 D1
3184 A2
3186 A2
3201 B1
3202 B1
3203 B1
3206 B1
3207 B1
3209 B1
3211 B1
3231 B1
3232 B1
3410 C2
3430 D2
3432 D2
3440 C3
3441 C2
3447 C2
3451 C2
3453 C3
3454 C3
3455 B3
3456 C3
3457 C3
3460 C2
3461 D2
3462 C2
3463 D2
3465 C2
3466 C2
3476 C2
3480 B1
3481 B1
3487 B1
3489 B1
3490 B1
3492 B2
3499 B1
3520 C4
3522 C4
3524 B4
3525 B4
3528 C4
3541 C3
3542 C3
3545 C3
3547 C3
3548 C3
3580 A3
3581 C4
3601 B2
3602 B2
3607 B2
3642 B2
3643 B2
3644 B2
3645 B2
3646 C1
3681 A2
3682 A2
3683 A3
3685 A3
3686 A3
3687 A3
3688 A2
3689 A2
3694 A3
3861 A1
3862 A2
3863 A2
3864 A2
3867 A2
3902 A1
3903 A1
3904 A1
3905 A1
3906 A1
3907 A1
3909 A1
3911 A1
3981 A1
4182 A3
4405 C3
4410 C2
4411 C2
4412 C2
4413 C2
4414 C2
4423 C2
4444 D3
4447 C3
4461 A3
4465 D1
4490 B2
4491 A2
4492 B2
4494 B1
4495 B2
4496 A2
4498 B2
4499 B2
4501 B4
4606 B1
4619 B2
4634 A2
4640 B2
4661 B2
4852 A1
4861 A1
4862 A2
4863 A2
4865 A1
4921 A1
4922 A1
4923 A1
4924 A1
4925 A1
4927 A1
4928 A1
4981 A1
4982 A1
4983 A1
4984 A1
6423 D2
6426 D3
6445 D3
6451 C2
6452 C2
6460 D2
6464 D2
6481 B1
6491 A2
6492 A1
6505 B3
6624 B2
6626 A1
6627 A1
6628 A2
6681 B1
6908 A1
7201 B1
7202 B1
7422 D2
7423 D2
7451 C3
7461 C2
7462 C2
7466 C2
7491 B2
7520 C4
7523 C4
7541 C3
7580 A3
7601 B2
7861 A2

8. Alignments

Index of this chapter:
1. General Alignment Conditions
2. Hardware Alignments
3. Software Alignments and Settings

Note: The Service Default Alignment Mode (SDAM) is described in the "Service Modes, Error Codes and Fault Finding" section. SDAM menu navigation is performed by using the MENU UP, MENU DOWN, MENU LEFT, and MENU RIGHT keys of the remote control transmitter.

8.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:
- AC voltage and frequency: according to country's standard.
- Connect the television set to the AC power via an isolation transformer.
- Allow the television set to warm up for approximately 20 minutes.
- Measure the voltages and waveforms in relation to chassis ground (with the exception of the voltages on the primary side of the power supply). Never use heatsinks as ground.
- Test probe: Ri > 10 M ohm; Ci < 2.5 pF.
- Use an isolated trimmer/screwdriver to perform the alignments.

8.2 Hardware Alignments

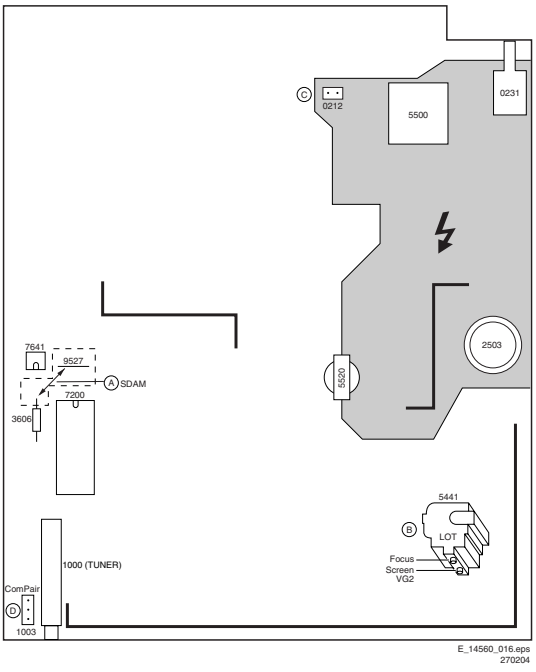


Figure 8-1 Top view Mono Carrier

8.2.1 Vg2 Adjustment

1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the WHITE TONE sub menu.
3. Press the MENU LEFT/RIGHT key to enter the WHITE TONE sub menu.
4. In the WHITE TONE sub menu, press the MENU UP/DOWN keys to select NORMAL RED, NORMAL GREEN, or NORMAL BLUE.
5. Use the MENU LEFT/RIGHT keys to set the values of NORMAL RED, NORMAL GREEN and NORMAL BLUE to '40'.
6. Press the MENU button twice to enter the normal user menu.
7. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu (if necessary).
8. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
9. Use the MENU UP/DOWN keys to select CONTRAST. Be sure to record the current value of CONTRAST.
10. Use the MENU LEFT/RIGHT keys to set the value of CONTRAST to '0'.
11. Use the MENU UP/DOWN keys to select BRIGHTNESS. Be sure to record the current value of BRIGHTNESS.
12. Use the MENU LEFT/RIGHT keys to set the value of BRIGHTNESS to minimum (OSD just visible in a dark room).
13. Press the MENU button twice to return to the top level SDAM menu.
14. Press the OSD/STATUS button to hide the SDAM onscreen display ("S" indication remains visible). This, to avoid interferences during the waveform measurements
15. Connect the RF output of a video pattern generator to the antenna input, and input a 'black picture' test pattern to the television set.
16. Set the oscilloscope to 50 V/div and the time base to 0.2 milliseconds (external triggering on the positive vertical pulse with a 10:1 probe).
17. Ground the scope at the CRT panel and connect a 100:1 probe to one of the cathodes of the picture tube socket (pin 7= Red, pin 9= Green, and pin 3= Blue, see also schematic diagram B1). Measure the level of the black current measuring pulses. These are the second line (Red), third line (Green), and fourth line (Blue) directly after the frame blanking (see figure "V_cut-off"). Remark: This chassis is using a TDA93XX UOC series. These use two different measuring pulses at each of the R, G, and B outputs. The above-mentioned level applies to the pulse with the lowest level of each gun.
18. Select the cathode with the highest V_dc value for the alignment. Adjust the V_cut-off of this gun with the SCREEN potentiometer (see figure "Top view family board") on the LOT to the correct value (see table "Vg2 alignment values").
19. Press the OSD/STATUS button to display the SDAM onscreen display.
20. Press the MENU button to enter the normal user menu.
21. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu (if necessary).
22. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
23. Use the MENU UP/DOWN keys to select CONTRAST.
24. Use the MENU LEFT/RIGHT keys to reset the value of CONTRAST to the original value.
25. Use the MENU UP/DOWN keys to select BRIGHTNESS.
26. Use the MENU LEFT/RIGHT keys to reset the value of BRIGHTNESS to the original value.
27. Press the MENU button twice to return to the top level SDAM menu.
28. Use the POWER button on the remote control transmitter or the POWER button on the television set to turn off the television set. This will save the changes made in SDAM.

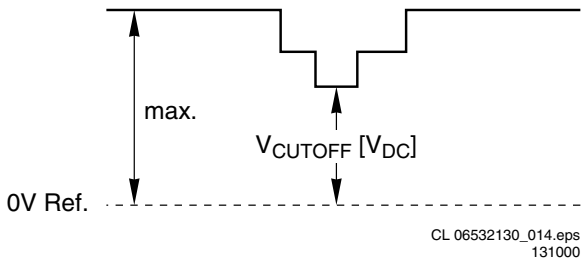


Figure 8-2 V_cutoff

Table 8-1 Vg2 alignment values

Screen Size	Cut-off point (V)
13V	+135 V ± 4 V
14RF	+135 V ± 4 V
20V	+140 V ± 4 V
20RF	+140 V ± 4 V

8.2.2 Focusing

1. Connect the RF output of a video pattern generator to the antenna input.
2. Input a circle or crosshatch test pattern to the television set.
3. Press the SMART PICTURE button on the remote control transmitter repeatedly to choose NATURAL (or MOVIES) picture mode.
4. Adjust the FOCUS potentiometer (see figure "Top view family board") until the vertical lines near the left and right sides of the screen, and near the horizontal center of the screen, are at minimum width without visible haze.

8.3 Software Alignments and Settings

The following options are performed in the Service Default Alignment Mode (SDAM). SDAM is described in the "Service Modes, Error Codes and Fault Finding" section.
The following alignments are explained:
1. OPTIONS
2. TUNER
3. WHITE TONE
4. GEOMETRY
5. AUDIO

8.3.1 OPTIONS

Options are used to control the presence or absence of certain features and hardware.

Note: Each option byte controls several features of the television set; therefore, before changing option byte information, it is important to record the current option byte values. This ensures that the television features can be restored to the original settings, if necessary.

How to Change an Option Byte
An Option Byte represents a number of different options. Changing these bytes directly makes it possible to set all options very fast. All options are controlled via seven option bytes. Select the option byte (OP 1.. OP 7) with the MENU UP/DOWN keys, and enter the new value.

1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the OPTIONS sub menu.
3. Press the MENU LEFT or MENU RIGHT key to enter the OPTIONS sub menu.
4. In the OPTIONS sub menu, press the MENU UP/DOWN keys to select 'OP 1' through 'OP 7'.
5. Use the number keys on the remote control transmitter to enter a new value for the selected option byte. The value must be entered as a three-digit value (for example, '4' would be entered as '0 0 4').
6. The selected value must be between '0' and '255'.
7. When all desired changes to the option bytes are made, press the MENU button to return to the top level SDAM menu. This will save changes to the option byte settings.
8. To ensure the option byte changes take effect:
   – Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
   – Disconnect the television set from AC power for at least ten seconds.
   – Reconnect the television set to AC power.
   – Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

Leaving the OPTION submenu saves the changes in the Option Byte settings. Some changes will only take effect after the set has been switched OFF and ON with the mains switch (cold start).

How to Calculate the Value of an Option Byte
Calculate an Option Byte value (OP 1 .. OP 7) in the following way:
1. Check the status of the single option bits (OB): are they enabled (1) or disabled (0).
2. When an option bit is enabled (1), it represents a certain value (see first column "value between brackets" in table below). When an option bit is disabled, its value is 0.
3. The total value of an Option Byte is formed by the sum of its eight option bits. See second table below for the correct Option Bytes per type number.

Bit (value)	OP1	OP2	OP3	OP4	OP5	OP6	OP7
0 (1)	OB10	OB20	OB30	OB40	OB50	OB60	OB70
1 (2)	OB11	OB21	OB31	OB41	OB51	OB61	OB71
2 (4)	OB12	OB22	OB32	OB42	OB52	OB62	OB72
3 (8)	OB13	OB23	OB33	OB43	OB53	OB63	OB73
4 (16)	OB14	OB24	OB34	OB44	OB54	OB64	OB74
5 (32)	OB15	OB25	OB35	OB45	OB55	OB65	OB75
6 (64)	OB16	OB26	OB36	OB46	OB56	OB66	OB76
7 (128)	OB17	OB27	OB37	OB47	OB57	OB67	OB77
Total:	**Sum**	**Sum**	**Sum**	**Sum**	**Sum**	**Sum**	**Sum**

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160603

Figure 8-3 Option Byte calculation

Table 8-2 Options settings

Typenumber	OP1	OP2	OP3	OP4	OP5	OP6	OP7
13MT1431/17	01	215	67	160	192	201	64
20MT1331/17	01	215	67	160	192	201	64
14MS2331/17	01	215	67	161	192	201	64
20MS2331/17	01	215	67	161	192	201	64

Option Bit Assignment
Following are the option bit assignments for all L03 software clusters.

Option bit description:

Option Byte			Option Bit Definition		
OP #		**Assignment**	**Bit = [0]**	**Bit = [1]**	**Default setting**
1	OBx0	CHINA or NTSC_ONLY	Tuning is not for China set or NTSC only set, or this option bit is not applicable	Tuning is for China set or NTSC only set	LATAM & NAFTA: 0 for other sets, 1
	OBx1	VIRGIN_MODE	Virgin mode is disabled or not applicable	Virgin mode is enabled. Plug and Play menu item will be displayed to perform installation at the initial startup of the TV when VIRGIN_MODE is set to 1. After installation is finished, this option bit will be automatically set to 0	LATAM & NAFTA: 0
	OBx2	UK_PNP	UK's default Plug and Play setting is not available or not applicable	UK's default Plug and Play setting is available. When UK_PNP and VIRGIN_MODE are set to 1 at the initial setup, LANGUAGE = ENGLISH, COUNTRY = GREAT BRITAIN and after exiting from menu, VIRGIN_MODE will be set automatically to 0 while UK_PNP remains 1	LATAM & NAFTA: 0
	OBx3	ACI	ACI feature is disabled or not applicable	ACI feature is enabled	LATAM & NAFTA: 0.
	OBx4	ATS (EU), or FINE_TUNING (NAFTA), or LANGUAGE_MALAY (AP)	Feature is disabled or not applicable	Feature is enabled	LATAM & NAFTA: 0
	OBx5	LNA	Auto Picture Booster is not available or not applicable	Auto Picture Booster is available	LATAM & NAFTA: 0
	OBx6	FM_RADIO	FM radio feature is disabled or not applicable	FM radio feature is enabled	LATAM & NAFTA: 0
	OBx7	PHILIPS_TUNER	ALPS / MASCO compatible tuner is in use	Philips compatible tuner is in use	LATAM & NAFTA: 0
2	OBx0	HUE	Hue/Tint Level is disabled or not applicable	Hue/Tint Level is enabled	LATAM & NAFTA: 0
	OBx1	COLOR_TEMP	Color Temperature is disabled or not applicable	Color Temperature is enabled	LATAM & NAFTA: 0
	OBx2	CONTRAST_PLUS	Contrast+ is disabled or not applicable	Contrast+ is enabled	LATAM & NAFTA: 0
	OBx3	TILT	Rotate Picture is disabled or not applicable	Rotate Picture is enabled	LATAM & NAFTA: 0
	OBx4	NOISE_REDUCTION	Noise Reduction (NR) is disabled or not applicable	Noise Reduction (NR) is enabled	LATAM & NAFTA: 0
	OBx5	CHANNEL_NAMING	Name FM Channel is disabled or not applicable	Name FM Channel is enabled	LATAM & NAFTA: 0. (Note: Name FM channel can be enabled only when FM_RADIO= 1)
	OBx6	SMART_PICTURE	Smart Picture is disabled or not applicable	Smart Picture is enabled	LATAM & NAFTA: 1
	OBx7	SMART_SOUND	Smart Sound is disabled or not applicable	Smart Sound is enabled	LATAM & NAFTA: 0 for mono sets, 1 for stereo sets.
3	OBx0	AVL	AVL is disabled or not applicable	AVL is enabled	LATAM & NAFTA: 0
	OBx1	WSSB or HOME_CINEMA	WSSB is disabled or not applicable	WSSB is enabled	LATAM & NAFTA: 0. (Note: This option bit can be set to 1 only when WIDE_SCREEN= 1)
	OBx2	WIDE_SCREEN	Software is used for 4:3 set or not applicable	Software is used for 16:9 set	LATAM & NAFTA: 0
	OBx3	Virtual Dolby			LATAM & NAFTA: 1
	OBx4	MSP34X5_VOL_CTRL	Not applicable	applicable	LATAM & NAFTA: 1
	OBx5	COMPRESS_16_9	COMPRESS 16:9 selection is not applicable. Item should not be in the FORMAT menu list	COMPRESS 16:9 selection is applicable. Item should not be in the FORMAT menu list	LATAM & NAFTA: 0
	OBx6	EXPAND_4_3	Expand 4:3 selection is not applicable. Item should not be in the FORMAT menu list,	Expand 4:3 selection is applicable. Item should be in the FORMAT menu list	LATAM & NAFTA: 0
	OBx7	EW_FUNCTION	EW function is disabled. In this case, only Expand 4:3 is allowed, Compress 16:9 is not applicable	EW function is enabled. In this case, both Expand 4:3 and Compress 16:9 are applicable.	LATAM & NAFTA: 0
4	OBx0	STEREO_NON_DBX	For AP_NTSC, chip TDA 9853 is not present	For AP_NTSC, chip TDA 9853 is present	LATAM & NAFTA: 0 for mono sets, 1 for stereo sets.
	OBx1	STEREO_DBX	For AP_NTSC, chip MSP 3445 is not present	For AP_NTSC, chip MSP 3445 is present	LATAM & NAFTA: 0
	OBx2	STEREO_PB or KOREAN_2CS	For AP_PAL, chip MSP3465 is not present	For AP_PAL, chip MSP3465 is present	LATAM & NAFTA: 0
	OBx3	STEREO_NICAM_2CS	For EU and AP_PAL, chip MSP 3415 is not present	For EU and AP_PAL, chip MSP 3415 is present	LATAM & NAFTA: 0
	OBx4	DELTA_VOLUME	Delta Volume Level is disabled or not applicable	Delta Volume Level is enabled	LATAM & NAFTA: 0
	OBx5	ULTRA_BASS	Ultra Bass is disabled or not applicable	Ultra Bass is enabled	LATAM & NAFTA: 0 for mono sets, 1 for stereo sets
	OBx6	VOLUME_LIMITER	Volume Limiter Level is disabled or not applicable	Volume Limiter Level is enabled	LATAM & NAFTA: 0
	OBx7	INCR_SUR	Incredible Surround feature is disabled	Incredible Surround feature is enabled	LATAM & NAFTA: 0 for mono sets, 1 for stereo sets.

Option Byte			Option Bit Definition		
OP #		Assignment	Bit = [0]	Bit = [1]	Default setting
5	OBx0	PIP or CLOCK	Feature is disabled or not applicable	Feature is enabled	LATAM & NAFTA: 0
	OBx1	HOTEL_MODE	Hotel mode is disabled or not applicable	Hotel mode is enabled	LATAM & NAFTA: 0 for stereo sets, 1 for mono sets.
	OBx2	SVHS	SVHS source is not available	SVHS source is available	LATAM & NAFTA: 0. (Note: This option bit is not applicable for EU)
	OBx3	CVI	CVI source is not available	CVI source is available	
	OBx4	AV3	Side/Front AV3 source is not present	Side/Front AV3 source is present	LATAM & NAFTA: 0.
	OBx5	AV2	AV2 source is not present	AV2 source is present	LATAM & NAFTA: 0. (Note: For EU, when AV2=1, both EXT2 and SVHS2 should be included in the OSD loop)
	OBx6	AV1	AV1 source is not present	AV1 source is present	LATAM & NAFTA: 0
	OBx7	NTSC_PLAYBACK	NTSC playback feature is not available	NTSC playback feature is available	LATAM & NAFTA: 0
6	OBx0	BASS_TREBLE	Feature is not available	Feature is available	LATAM & NAFTA: 0 for mono sets, 1 for stereo sets
	OBx1	SMART_TEXT	Smart Text Mode and Favorite Page are disabled or not applicable	Smart Text Mode and Favorite Page are enabled	LATAM & NAFTA: 1
	OBx2	SMART_LOCK	Child Lock and Lock Channel are disabled or not applicable for EU	Child Lock and Lock Channel are enabled for EU	LATAM & NAFTA: 1
	OBx3	VCHIP (LATAM & NAFTA & NAFTA) / TXT_1PG (EU)	Feature is disabled	Feature is enabled	LATAM & NAFTA: 1
	OBx4	WAKEUP_CLOCK	Wake up clock feature is disabled or not applicable	Wake up clock feature is enabled	LATAM & NAFTA: 1
	OBx5	SMART_CLOCK	Smart Clock Using Teletext and Smart Clock Using PBS is disabled or not applicable	Smart Clock Using Teletext and Smart Clock Using PBS is enabled. For NAFTA, menu item AUTOCHRON is present in the INSTALL submenu	LATAM & NAFTA: 0
	OBx6	SMART_SURF	Smart Surf feature is disabled or not applicable	Smart Surf feature is enabled	LATAM & NAFTA: 1
	OBx7	PERSONAL_ZAPPING	Personal Zapping feature is disabled or not applicable	Personal Zapping feature is enabled	LATAM & NAFTA: 0
7	OBx0	SYSTEM_LT_1 and SYSTEM_LT_2	These two option bits are allocated for LATAM system selection. (00: NTSC-M ; 01: NTSC-M, PAL-M ; 10: NTSC-M, PAL-M, and PAL-N ; 11: NTSC-M, PAL-M, PAL-N, and PAL-BG)	LATAM & NAFTA: 0	
	OBx1			LATAM & NAFTA: 0	
	OBx2	SOUND_SYSTEM_AP	OB70,OB71,OB72;These three option bits are allocated for AP_PAL sound system selection. (000: BG ; 001: BG / DK ; 010: I / DK ; 011: BG / I / DK ; 100: BG / I / DK / M)	LATAM & NAFTA: 0	
	OBx3	COLOR_SYSTEM_AP (This option bit is allocated for AP-PAL color system selection)	Auto, PAL 4.43, NTSC 4.43, and NTSC 3.58	Auto, PAL 4.43, NTSC 4.43, NTSC 3.58, and SECAM	LATAM & NAFTA: 0
	OBx4	SIGNAL_STRENGTH / DVD WAKEUP TIMER (DVD COMBI), 3D_COMBFILTER (NAFTA)		LATAM & NAFTA: 1	
	OBx5	LNA_PP (for L01 AP cluster), VOICE_CONTROL		LATAM & NAFTA: 0	
	OBx6	ACTIVE_CONTROL		LATAM & NAFTA: 1	
	OBx7	TIME_WIN1	The time window is set t 1.2 s.	The time window is set to 2 s	LATAM & NAFTA: 0 (Note: The time-out for all digit entries depends on this setting)
8	OBx0	MALAY_TEXT	disable	enable	LATAM & NAFTA: 1
	OBx1	HINDI	disable	enable	LATAM & NAFTA: 1
	OBx2	HANGUL	disable	enable	LATAM & NAFTA: 0
	OBx3	THAI	disable	enable	LATAM & NAFTA: 0
	OBx4	AENGLISH	disable	enable	LATAM & NAFTA: 0
	OBx5	ARABIC	disable	enable	LATAM & NAFTA: 0
	OBx6	CHINESE_TRAD	disable	enable	LATAM & NAFTA: 0
	OBx7	CHINESE_SIMP_TEXT	disable	enable	LATAM & NAFTA: 0

8.3.2 TUNER

Note: Described alignments are only necessary when the NVM (part reference number 7641) is replaced.

IFPLL
This adjustment is auto-aligned. Therefore, no action is required (default= "30").

AGC (AGC take over point)
1. Connect the RF output of a video pattern generator to the antenna input.
2. Input a color bar test pattern to the television set.
3. Set the amplitude of the video pattern generator to 10 mV and set the frequency to 475.25 MHz (PAL/SECAM) or 61.25 MHz (NTSC).
4. Connect a DC multimeter to pin 1 of the tuner (item 1000 on the main chassis).
5. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
6. Use the MENU UP/DOWN keys to highlight the TUNER sub menu.
7. Press the MENU LEFT/RIGHT keys to enter the TUNER sub menu.
8. Use the MENU UP/DOWN keys to select AGC.
9. Use the MENU LEFT/RIGHT keys to adjust the AGC value (default value is "32") until the DC-voltage at pin 1 of the tuner lies is 3.3 V.
10. Press the MENU button to return to the top level SDAM menu.
11. To ensure the AGC change takes effect:
    – Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
    – Disconnect the television set from AC power for at least ten seconds.
    – Reconnect the television set to AC power.
    – Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

SL (Slicing Level)
This adjustment sets the sync slicing level for non-standard signals. You must turn it 'on' to have no picture instability in premium decoded cable channels.
- OFF: slicing level dependent on noise level.
- ON: fixed slicing level of 70 %.

To adjust SL:
1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the TUNER sub menu.
3. Press the MENU LEFT/RIGHT keys to enter the TUNER sub menu.
4. Use the MENU UP/DOWN keys to select SL.
5. Use the MENU LEFT/RIGHT keys to toggle SL 'Off' and 'On'.
6. Press the MENU button to return to the top level SDAM menu.
7. To ensure the SL setting is saved:
    – Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
    – Disconnect the television set from AC power for at least ten seconds.
    – Reconnect the television set to AC power.
    – Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

CL (Cathode Drive Level)
Fixed value is "7".

8.3.3 WHITE TONE

The values of the 'black cut-off level' can be adjusted in the 'WHITE TONE' sub menu.
Normally, no alignment is needed for 'WHITE TONE', and the given default values are used.

Default settings for **NORMAL** (color temperature= 11500 K):
NORMAL RED = 22
NORMAL GREEN = 21
NORMAL BLUE = 26

To adjust NORMAL RED, NORMAL GREEN, and NORMAL BLUE:
1. Connect the RF output of a video pattern generator (e.g. PM5418) to the antenna input.
2. Set the amplitude of the video pattern generator to at least 1 mV and set the frequency to 475.25 MHz (PAL/SECAM) or 61.25 MHz (NTSC).
3. Input a "100 IRE white" pattern to the television set.
4. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
5. Use the MENU UP/DOWN keys to highlight the WHITE TONE sub menu.
6. Press the MENU LEFT/RIGHT keys to enter the WHITE TONE sub menu.
7. Use the MENU UP/DOWN keys to select NORMAL RED, NORMAL GREEN, or NORMAL BLUE.
8. Set the Minolta CA100 color analyzer (or equivalent) in RGB mode, and set all color temperature settings to their default values.
9. Place the color sensor of the meter in the middle of the screen.
10. Set the meter in "T-dUV-Y" mode, and set CONTRAST to make the light output "Y" on the meter 90 nit $\pm$ 15%
11. Use the MENU LEFT/RIGHT keys to adjust the value of NORMAL GREEN and/or NORMAL BLUE.
12. When all desired changes to the WHITE TONE sub menu values are made, press the MENU button to return to the top level SDAM menu.
13. To ensure the WHITE TONE settings are saved:
    – Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
    – Disconnect the television set from AC power for at least ten seconds.
    – Reconnect the television set to AC power.
    – Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

8.3.4 GEOMETRY

Introduction

The geometry alignment menu contains several items for correct picture geometry alignment.

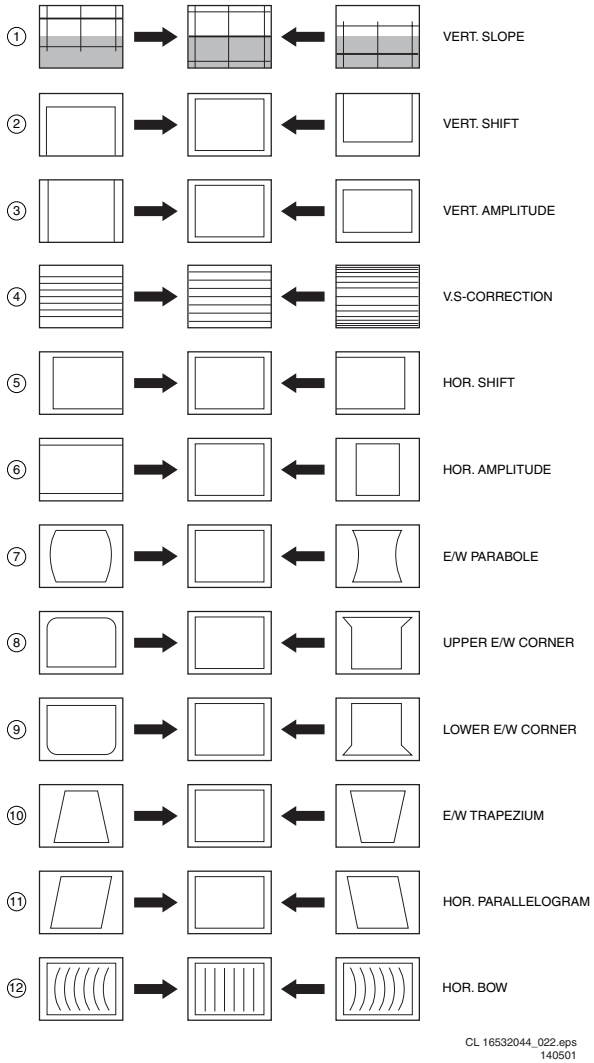


Figure 8-4 Geometry alignments

1. Connect the RF output of a video pattern generator to the antenna input.
2. Input a crosshatch test pattern to the television set.
3. Set the amplitude of the video pattern generator to at least 1 mV and set the frequency to 475.25 MHz (PAL/SECAM) or 61.25 MHz (NTSC).
4. Press the SMART PICTURE button on the remote control transmitter repeatedly to choose PERSONAL or MOVIES picture mode.
5. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
6. Use the MENU UP/DOWN keys to highlight the GEOMETRY sub menu.
7. Press the MENU LEFT/RIGHT keys to enter the GEOMETRY sub menu.
8. Use the MENU UP/DOWN keys to highlight either the HORIZONTAL sub menu or the VERTICAL sub menu.
9. Press the MENU LEFT/RIGHT keys to enter either the HORIZONTAL sub menu or the VERTICAL sub menu.
10. Use the MENU UP/DOWN keys to select items in the HORIZONTAL sub menu or the VERTICAL sub menu.
11. Use the MENU LEFT/RIGHT keys to adjust the values of items in the HORIZONTAL and VERTICAL sub menus.
12. When all desired changes to the HORIZONTAL and VERTICAL sub menu values are made, press the MENU button twice to return to the top level SDAM menu.
13. To ensure the GEOMETRY settings are saved:
    – Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
    – Disconnect the television set from AC power for at least ten seconds.
    – Reconnect the television set to AC power.
    – Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

The following alignments can be performed in the GEOMETRY sub menu:

Horizontal Alignments:

- Horizontal Shift (HSH). Select Horizontal Shift to canter the picture on the screen.
- Picture Width (PW). Aligns the width of the picture.

Vertical Alignments:

- Vertical slope (VSL). Aligns the picture so the proportions are the same at the top and bottom of the screen. This alignment must be performed first, before all other vertical alignments. Turning SBL, 'on' will assist in performing this alignment.
- Vertical Amplitude (VAM). Aligns the height of the picture (other vertical alignments are NOT compensated).
- Vertical S-Correction (VSC). Aligns the vertical linearity, so that the vertical intervals of the grid-patterns are the same over the entire height of the screen.
- Vertical Shift (VSH). Aligns the vertical center of the picture to the vertical center of the CRT. After performing this alignment, it may be necessary to perform the VAM alignment again.
- Service blanking (SBL). Turns the blanking of the lower half of the screen 'on' or 'off' (to be used in combination with the vertical slope alignment).

Methods of Adjustment

Vertical Amplitude and Position

1. Select SERVICE BLANKING (SBL) and set it to 1. The lower half of the picture will be blanked.
2. Press the MENU UP/DOWN buttons to select VERTICAL SLOPE (VSL).
3. Align VSL to start the blanking exactly at the horizontal white line at the canter of the test circle (align the bottom of the screen so that castellations just disappear).
4. Press the MENU UP/DOWN buttons to select SBL and set it back to 0. The full picture reappears.
5. Select VERTICAL AMPLITUDE (VAM) and align the picture height to approximately 13.0 - 13.1 blocks (align the top of the screen so that castellations just disappear).
6. Select VERTICAL SHIFT (VSH) and align for vertical centering of the picture on the screen.
7. Repeat the last two steps if necessary.

Horizontal Phase

1. Set PW to "0".
2. Select Horizontal Shift (HSH) to center the picture on the screen.

Horizontal and Vertical Shift Offset for NTSC (TRINOMA and PAL chassis)

1. Align the set for VSH and HSH (according to above mentioned procedures) with a PAL system signal.
2. Change the signal to NTSC system and adjust HORIZONTAL SHIFT OFFSET (H60) and VERTICAL SHIFT OFFSET (V60) to center the picture on the screen.
3. Repeat if necessary.

The table below lists the default GEOMETRY values for the different television sets.

Table 8-3 Default geometry values

Alignment	Description	13V	14RF	20V	20RF
PW 31	Picture Width	-	-	-	-
HSH	Horizontal Shift	35	35	35	35
VSL	Vertical Slope	35	35	35	35
VAM	Vertical Amplitude	26	26	26	26
VSC	Vertical S orrection	23	23	23	23
VSH	Vertical Shift	35	35	35	35

8.3.5 AUDIO

Necessary measuring equipment:
- MTS (Multi-channel Television Sound) generator (e.g. Fluke 54200).
- AC millivolt meter.

ILA (Input Level Alignment)
1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the AUDIO sub menu.
3. Press the MENU LEFT/RIGHT keys to enter the AUDIO sub menu.
4. Use the MENU UP/DOWN keys to select ILA.
5. Apply a BTSC sound signal with a signal strength of 60 dBuV (1 mV_rms) to the aerial input. Measure the output on pin 16 (Main_outL) of IC7861 with an AC millivoltmeter via a Low Pass Filter (R= 10 kohm, C= 1.5 nF, measure on the capacitor).
6. Use the MENU LEFT/RIGHT keys to adjust the meter reading to 106 mV_rms ± 2 mV_rms (default ILA value is "31").
7. Press the MENU button to return to the top level SDAM menu.
8. To ensure the ILA setting is saved:
   – Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
   – Disconnect the television set from AC power for at least ten seconds.
   – Reconnect the television set to AC power.
   – Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

LSA (Low Separation Alignment)
1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the AUDIO sub menu.
3. Press the MENU LEFT/RIGHT keys to enter the AUDIO sub menu.
4. Use the MENU UP/DOWN keys to select LSA.
5. Apply a 300 Hz BTSC sound signal with a signal strength of 60 dBuV (1 mV_rms) to the aerial input (only the left channel of the stereo signal). Measure the output on pin 22 (R_OUT) of IC7841 with an AC millivoltmeter.
6. Use the MENU LEFT/RIGHT keys to adjust the meter reading to a minimum value (default LSA value is "7" for stereo sets, and "0" for mono sets).
7. Press the MENU button to return to the top level SDAM menu.
8. To ensure the LSA setting is saved:
   – Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
   – Disconnect the television set from AC power for at least ten seconds.
   – Reconnect the television set to AC power.
   – Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

HSA (High Separation Alignment)
1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the AUDIO sub menu.
3. Press the MENU LEFT/RIGHT keys to enter the AUDIO sub menu.
4. Use the MENU UP/DOWN keys to select HSA.
5. Apply a 3 kHz BTSC sound signal with a signal strength of 60 dBuV (1 mV_rms) to the aerial input (only the left channel of the stereo signal). Measure the output on pin 22 (R_OUT) of IC7841 with an AC millivoltmeter.
6. Use the MENU LEFT/RIGHT keys to adjust the meter reading to a minimum value (default HSA value is "31").
7. Press the MENU button to return to the top level SDAM menu.
8. To ensure the HSA setting is saved:
   – Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
   – Disconnect the television set from AC power for at least ten seconds.
   – Reconnect the television set to AC power.
   – Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

9. Circuit Descriptions, List of Abbreviations, and IC Data Sheets

Index of this chapter:
1. Introduction.
2. Source Selection.
3. Audio.
4. Video.
5. Synchronization.
6. Deflection.
7. Power Supply.
8. Control.
9. Abbreviations.
10. IC Data Sheets.

Notes:
- Only **new** circuits (compared to the L01.2 chassis) are described in this chapter. For the other circuit descriptions, see the manual of the L01.2L AA. This manual is available in different languages:
  - 3122 785 11800 = Spanish.
  - 3122 785 11820 = Portuguese.
- Figures can deviate slightly from the actual situation, due to different set executions.
- For a good understanding of the following circuit descriptions, please use the block diagram in chapter 6, and/or the electrical diagrams in chapter 7. Where necessary, you will find a separate drawing for clarification.

9.1 Introduction

The "L03"' chassis is a global TV chassis for the model year 2003 and is used for TV sets with screen sizes from 14 inch to 21 inch, in Super Flat and Real Flat executions. In comparison to its predecessor (the "L01"), this chassis is further simplified: it contains economized executions of the power supply, the video processing (microprocessor), and the audio processing. Due to a cost down action this chassis has some more simplified circuitry like the audio processing and some parts are fully omitted like top-control.

The standard architecture consists of a Main panel (called "family board") and a Picture Tube panel. The Main panel consists primarily of conventional components with some surface mounted devices in the audio and video processing part.

The functions for video processing, microprocessor (P), and CC/Teletext (TXT) decoder are combined in one IC (TDA937x), the so-called Ultimate One Chip (UOC). This chip is mounted on the component side of the main panel.

The L03 can be divided into two basic systems, i.e. mono and stereo sound. While the audio processing for the mono sound is done in the audio block of the UOC, external audio processing ICs are used for stereo sets.

The tuning system features 181 channels with on-screen display. The main tuning system uses a tuner, a microcomputer, and a memory IC mounted on the main panel. The microcomputer communicates with the memory IC, the customer keyboard, remote receiver, tuner, signal processor IC and the audio output IC via the I2C bus. The memory IC retains the settings for favorite stations, customer-preferred settings, and service / factory data.
The on-screen graphics and closed caption decoding are done within the microprocessor where they are added to the main signal.

The chassis uses a Switching Mode Power Supply (SMPS) for the main voltage source. The chassis has a 'hot' ground reference on the primary side and a cold ground reference on the secondary side of the power supply and the rest of the chassis.

9.2 Source Selection

The Source Select is divided mainly into two types, the "Mono Source Select" and the "Stereo Source Select".
- The Mono Source Select, both audio and video, will be done entirely by the UOC and will only be able to select one external audio source.
- As for the Stereo Source Select, the Panasonic IC, which is for BTSC decoding also, has 2 audio source inputs used for source selection, whereas the UOC will take care of the video selection.

9.2.1 Switching Function for Stereo I/O

Audio / Video Source Selection
The video source selection is done by the UOC. The video setting for LATAM / NAFTA is rather straightforward: a so-called "WYSIWYG" (what you see on the screen, is what you get from the video ouput).
There is only a front input available therefore the source selection is basically limited to the UOC.

9.2.2 Switching Function for Mono I/O

For the Mono configuration, only one input pin is available for the UOC.

Video Source Selection
The video switching is similar to the section above.

Audio Source Selection
The audio input (L1_IN) is connected to pin 35 of the UOC.

9.3 Audio

This chassis is targeted for the NAFTA market with Mono, Stereo, or SAP sound system.
For the "basic" Mono and Stereo sets, sound processing includes Volume control and AVL.
For stereo sets, IC TDA9853H is the BTSC audio signal decoder and audio processing..

9.3.1 Processing

This chassis uses the Intercarrier demodulation concept (one SAW filter for both video and audio). The base band (full bandwidth) BTSC audio signal from the UOC is fed to pin 14 of the stereo decoder. The Pilot detection and SAP detection registers indicate the type of transmitted audio signal such as Mono, Stereo, and/or SAP. Based on this indication, the software controls will help to output the appropriate audio signal at pins 21 and 22. The controls are done by the I2C bus connected to pins 18 and 19.
Internal or External audio (pins 2, 3, 23, and 24) can also be selected by the source selection register. For the selected audio source, the AGC function can be applied. The output is a fixed level output. The volume control function is available via the power amplifier (AN7522/23).

9.3.2 Amplifier

The output is fed to the audio amplifier (IC7901 for stereo sets or IC7902 for mono sets). This is a BTL amplifier (Bridge Tied Load), which is actually a class AB amplifier with four transistors for each channel. The advantage of BTL over the standard Class AB amplifier is that it requires a lower supply voltage to deliver a higher output.

The volume level is controlled at this IC (pin 9) by the "VOLUME" control line coming from the microprocessor. After amplification, the audio signal is send to the speaker / headphone output connector.

9.3.3 AVL (Automatic Volume Limiting)

The "Mono AVL" function operates via the UOC. During channel change and source selection, the AVL bit is to be switched "off" and then can resume to the previous state ("on/off") as shown in the timing diagram below.

The "Stereo AVL" function operates via the AGC control of IC TDA9853H. During channel change and source selection, the AGC function is to be switched "off" and then can resume to the previous state ("on/off") as shown in timing diagram below.

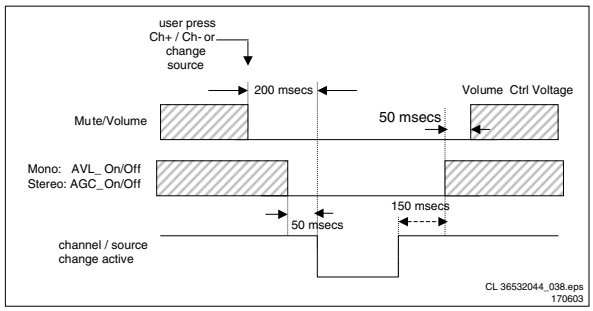


Figure 9-1 AVL timing diagram

9.3.4 Mute

The TV set must mute:
- Whenever a "User Mute" is activated.
- Whenever there is a channel change, RF to RF, RF to AV, AV to RF, and AV to AV (if any). In channel change, MUTE must be activated first before any other activity and un-MUTE must be done after every other activity has been completed.
- Whenever there is a loss in the signal.
- During cold or warm start, MUTE must be activated until all initialization processes are finished.
- When the set is going to STANDBY, MUTE must be activated first before any other activities.

Note:
1. MUTE mentioned above applies for the audio amplifier mute (= PWM volume control mute).
2. The first condition does not apply for the UOC, IC TDA9853H.
3. Above conditions refers to both mono and stereo sets.

9.4 Video

For a detailed circuit description of this part, we refer to the L01.2L AA manual (see the beginning of this chapter for the ordering codes). Please note that there can be minor differences in the text (e.g. other item numbers), but the described circuit principle is comparable.

This chassis uses the TDA937x family Ultimate One Chip TV processor (UOC), which is mounted in an SDIP 64 envelope. The various versions of the UOC series combine the function of a video processor together with a microcontroller and US Closed Caption/TXT decoder.

9.5 Synchronization

Inside IC7200 (part D) the vertical and horizontal sync pulses are separated. These "H" and "V" signals are synchronized with the incoming CVBS signal. They are then fed to the H- and V-drive circuits and to the OSD/TXT circuit for synchronization of the On Screen Display and Teletext (CC) information.

9.6 Deflection

For a detailed circuit description of this part, we refer to the L01.2L AA manual (see the beginning of this chapter for the ordering codes). Please note that there can be minor differences in the text (e.g. other item numbers), but the described circuit principle is comparable.

The L03 range consists of TV sets spanning from 14 to 21 inch using the same chassis architecture. For the chassis architecture, the CRTs used do not need East/West Correction. Therefore the geometry correction needed is horizontal shift, vertical slope, vertical amplitude, vertical S-correction, vertical shift and vertical zoom for geometry corrections (with the appropriate offsets required for NTSC channels on PAL sets).

9.7 Power Supply

For a detailed circuit description of this part, we refer to the L01.2L AA manual (see the beginning of this chapter for the ordering codes). Please note that there can be minor differences in the text (e.g. other item numbers), but the described circuit principle is comparable.

9.7.1 Introduction

The supply is a Switching Mode Power Supply (SMPS). The frequency of operation varies with the circuit load. This 'Quasi-Resonant Flyback' behavior has some important benefits compared to a 'hard switching' fixed frequency Flyback converter. The efficiency can be improved up to 90%, which results in lower power consumption. Moreover, the supply runs cooler and safety is enhanced.
The control IC in this power supply is the TEA1506 (L01= TEA1507). Unlike the TEA1507 control IC, the TEA1506 has no internal high voltage start-up source, and therefore needs to be started by means of an external bleeder resistor (R3506 and R3507). The operating voltage for the driver circuit is also taken from the 'hot' side of this transformer.
The switching regulator IC 7520 starts switching the FET 'on' and 'off', to control the current flow through the primary winding of transformer 5520. The energy stored in the primary winding during the 'on' time is delivered to the secondary windings during the 'off' time.
The "MainSupply" line is the reference voltage for the power supply. It is sampled by resistors 3543 and 3544 and fed to the input of the regulator 7540 / 6540. This regulator drives the feedback optocoupler 7515 to set the feedback control voltage on pin 6 of 7520.
The power supply in the set is "on" any time AC power is connected to the set.

9.7.2 Derived Voltages

The voltages supplied by the secondary windings of T5520 are:
- "MainSupply" for the horizontal output.
- "V_aux/V_audio" for the audio circuit.
- An optional "DVD_Supply" for future extensions.

Other voltages are provided by the LOT. It supplies -12 V, the tuner voltage, the filament voltage, and the +160 V source for the video drive. These secondary voltages of the LOT are monitored by the "EHT" lines.

9.8 Control

The microprocessor part of the UOC has the complete control and CC/Teletext processing on board. The User menu's and Service Default / Alignment Mode's are generated by the uP. Communication to other ICs is done via the I2C-bus.

9.8.1 I2C-Bus

The main control system, which consists of the microprocessor part of the UOC (7200), is linked to the external devices (Tuner, NVM, Audio ICs, etc) by means of the I2C-bus. An internal I2C-bus is used to control other signal processing functions, like video processing, sound IF, vision IF, synchronization, etc.

9.8.2 User Interface

The chassis uses a remote control with RC5 protocol. The incoming signal is connected to pin 67 of the UOC.
The keyboard, connected to UOC pin 8, can also control the set. Button recognition is done via a voltage divider.
The front LED (6691) is connected to an output control line of the microprocessor (pin 11). It is activated to provide the user information about whether or not the set is working correctly (e.g., responding to the remote control, normal operation (USA only) or fault condition)

9.8.3 I/O Selection

For the control of the input and output selections, there are three lines:

STATUS1
This signal provides information to the microprocessor on whether a video signal is available on the SCART1 AV input and output port (only for Europe). This signal is not connected in LATAM/NAFTA sets.

STATUS2
This signal provides information to the microprocessor on whether a video signal is available on the SCART2 AV input and output port (only for Europe).
For sets with an SVHS input it provides the additional information if a Y/C or CVBS source is present.
The presence of an external Y/C source makes this line 'high' while a CVBS source makes the line 'low'.

SEL_AV1_AV2
This is the source select control signal from the microprocessor. This control line is under user control or can be activated by the other two control lines.

9.8.4 Power Supply Control

The Power Supply is interfaced with the microcontroller (UOC) to provide the power supply with the control signals required for burst mode operation in standby and to vary the picture width by adjusting V_BAT.
The microprocessor part is supplied with 3.3 V and 8 V. The 3.3 V is derived from the "V_aux/V_audio" voltage via a 3V3 stabilizer (7493). The 8 V is derived from the 33V tuner voltage via TS7491 and TS7496.
Two signals are used to control the power supply: STD_CON and PW_ADJ.

STD_CON
This signal is generated by the microprocessor when over-current takes place at the "Main" line. This is done to enable the power supply into standby burst mode, and to enable this mode during a protection.
This is of logic "high" (3.3 V) under normal operation of the TV. When the TV set is in Standby (or fault) condition, this signal is a continuous pulse of 5 ms "low" (0 V) and 5 ms "high".
Note: In the L01 chassis this was inverted.

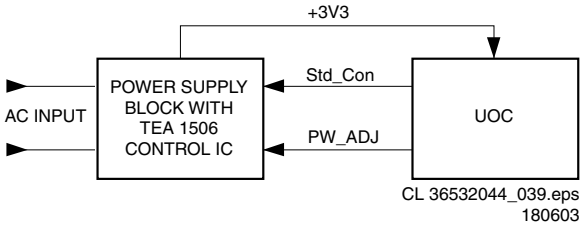


Figure 9-2 Block diagram of power supply interface with UOC

PW_ADJ
This signal is generated by the UOC through a PWM port. This PWM port is configured in Push Pull mode to generate a square wave signal of 0 to 100% duty cycle with a default value of 50% duty cycle.
PW_ADJ will eliminate tolerance and can adjust the picture wide slightly.

9.8.5 Protection Events

Several protection events are controlled by the UOC. In case one of these protections is activated, the set will go to "Standby" mode.

Deflection protections
The main protections for deflection are X-ray protection, frame amplifier failure detection, black current loop stability protection, and +8V auxiliary supply protection. For X-ray protection, the X-ray detection bit, XDT, must always be set to "1" (detection mode). High EHT protection must be triggered via software upon detection of the XPR bit switching to "1".
A suitable number of checks are done before putting the set into protection mode in order to prevent false triggering.
For service requirements, the Enable Vertical Guard (RGB blanking), EVG, can be disabled (set to "0") although this is not necessary.

The following bits are monitored:
- SUP (Supply voltage indication)
- XPR (X-ray protection)
- EVG (Enable Vertical Guard)
- NDF (Output Vertical Guard)
- BCF (Black Current Failure)

I2C protection
To check whether all I2C IC's are functioning.

9.9 Abbreviation list

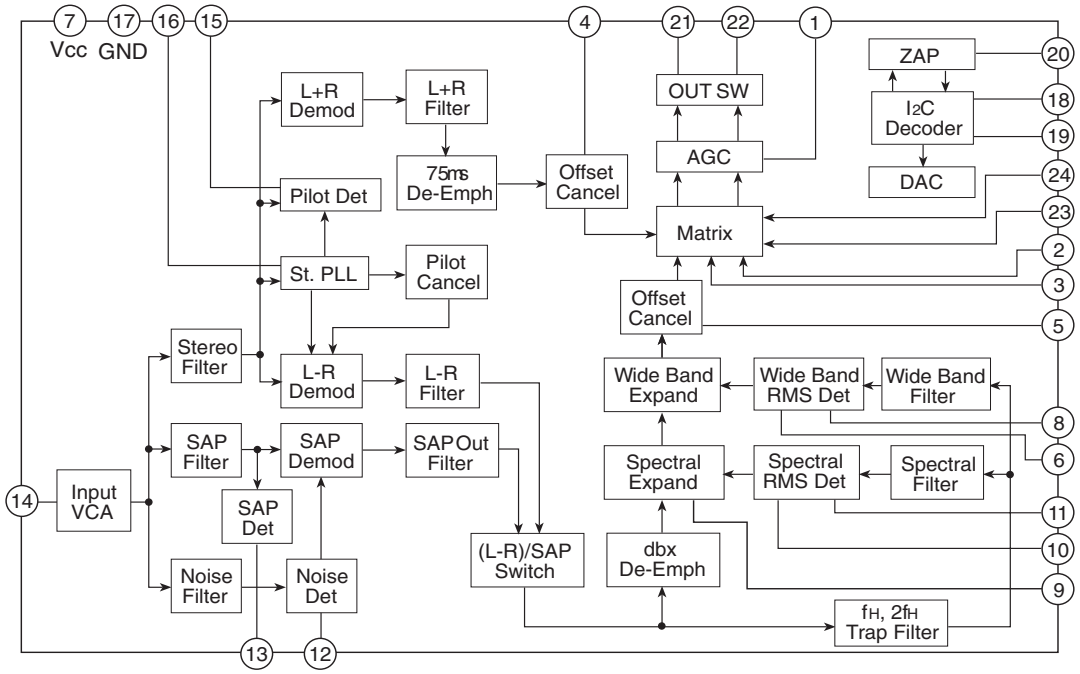
2CS	2 Carrier (or Channel) Stereo
ACI	Automatic Channel Installation: algorithm that installs TV sets directly from cable network by means of a predefined TXT page
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AFT	Automatic Fine Tuning
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box
AM	Amplitude Modulation
AP	Asia Pacific
AR	Aspect Ratio: 4 by 3 or 16 by 9
ATS	Automatic Tuning System
AV	External Audio Video
AVL	Automatic Volume Leveler
BCL	Beam Current Limitation
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries
CC	Closed Caption
ComPair	Computer aided rePair
CRT	Cathode Ray Tube or picture tube
CSM	Customer Service Mode
CTI	Color Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronization
CVI	Component Video Input
DAC	Digital to Analogue Converter
DBX	Dynamic Bass Expander or noise reduction system in BTSC
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz
DFU	Direction For Use: description for the end user
DNR	Dynamic Noise Reduction
DSP	Digital Signal Processing
DST	Dealer Service Tool: special remote control designed for dealers to enter e.g. service mode
DVD	Digital Versatile Disc
EEPROM	Electrically Erasable and Programmable Read Only Memory
EHT	Extra High Tension
EHT-INFO	Extra High Tension information
EPG	Electronic Programming Guide
EU	Europe
EW	East West, related to horizontal deflection of the set
EXT	External (source), entering the set via SCART or Cinch
FBL	Fast Blanking: DC signal accompanying RGB signals
FILAMENT	Filament of CRT
FM	Field Memory or Frequency Modulation
H	Horizontal sync signal
HP	Headphone
I	Monochrome TV system. Sound carrier distance is 6.0 MHz
I2C	Integrated IC bus
IF	Intermediate Frequency
IIC	Integrated IC bus
ITV	Institutional TV
LATAM	Latin American countries like Brazil, Argentina, etc.
LED	Light Emitting Diode
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
LS	Large Screen or Loudspeaker
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
NC	Not Connected
NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.
NTSC	National Television Standard Committee. Color system mainly used in North America and Japan. Color carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)
NVM	Non Volatile Memory: IC containing TV related data e.g. alignments
OB	Option Bit
OC	Open Circuit
OP	Option Byte
OSD	On Screen Display
PAL	Phase Alternating Line. Color system mainly used in West Europe (color carrier = 4.433619 MHz) and South America (color carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz)
PCB	Printed Circuit board
PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency
POR	Power-On Reset
PTP	Picture Tube Panel (or CRT-panel)
RAM	Random Access Memory
RC	Remote Control handset
RGB	Red, Green, and Blue video signals
ROM	Read Only Memory
SDAM	Service Default / Alignment Mode
SAP	Second Audio Program
SC	Sandcastle: pulse derived from sync signals
S/C	Short Circuit
SCL	Serial Clock
SDA	Serial Data
SECAM	SEequence Couleur Avec Memoire. Color system mainly used in France and East Europe. Color carriers = 4.406250 MHz and 4.250000 MHz
SIF	Sound Intermediate Frequency
SS	Small Screen
STBY	Standby
SVHS	Super Video Home System
SW	Software
THD	Total Harmonic Distortion
TXT	Teletext
uP	Microprocessor
UOC	Ultimate One Chip
V	Vertical sync signal
V_BAT	Main supply voltage for the deflection stage (mostly 141 V)
V-chip	Violence Chip
VCR	Video Cassette Recorder
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
XTAL	Quartz crystal
YC	Luminance (Y) and Chrominance (C) signal

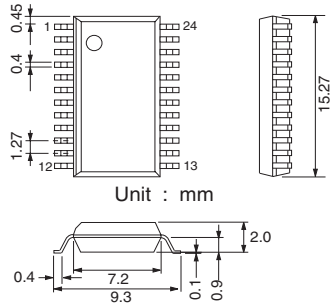
9.10 IC Data Sheets

This section shows the internal block diagrams and pin layouts of ICs that are drawn as "black boxes" in the electrical diagrams (with the exception of "memory" and "logic" ICs).

9.10.1 Diagram A5, AN5829S (IC7841)

Block Diagram





24-Lead PANAFLAT Package (SO-24D)

Test Circuit

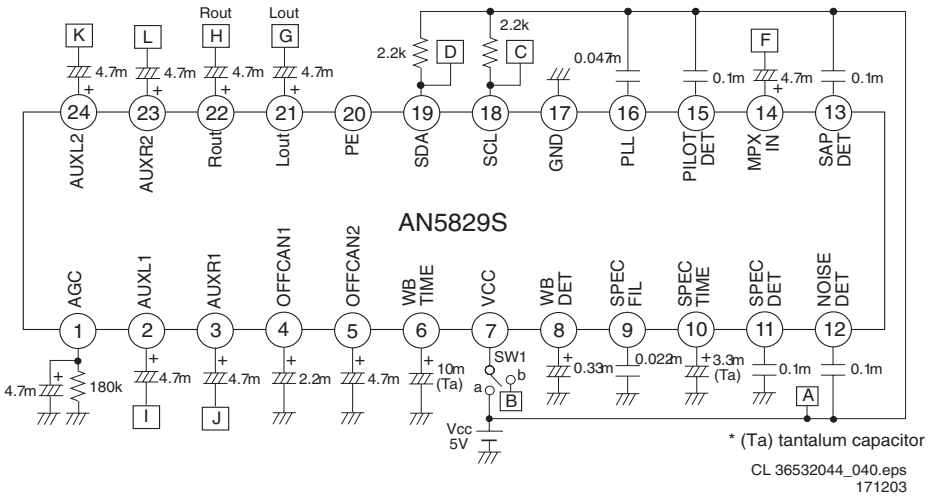


Figure 9-3 Internal Block Diagram and Pin Configuration

10. Spare Parts List

Mono Carrier [A]

Various

	9965 000 23771	Cable 8p 450mm
	9965 000 23800	Battery spring
1001	9965 000 23794	SAW M1971M
1003	9965 000 22823	Connector 3p
1100	9965 000 17469	Soc. RCA AV-3.2-2WK-N1
1101	9965 000 17623	Sock. RCA AV
1201	9965 000 23325	Xtal 4.5MB
1401	9965 000 17628	Connector 4p
1402	9965 000 14086	Connector 4p
1500	9965 000 23784	Fuse holder
1501	9965 000 23784	Fuse holder
1504	9965 000 23327	Fuse 74AL/250V
1511	9965 000 17635	Connector 3p
1512	9965 000 17635	Connector 3p
1515	9965 000 23783	Relay 12V SMIT-SS-112DM
1600	9965 000 17540	Switch tact
1601	9965 000 17540	Switch tact
1602	9965 000 17540	Switch tact
1603	9965 000 17540	Switch tact
1606	9965 000 17540	Switch tact
1621	9965 000 23770	Xtal 12MHZ
1622	9965 000 23771	Cable 8p 450mm
1861	9965 000 17688	Resonator 514.5kHz
1900	9965 000 15144	Connector 2p TJC3-2A
1900	9965 000 15150	Connector 5p TJC3-5A
1901	9965 000 17468	Soc. EARPHONE CK3-3.5-9WK-E

⊣⊢

2001	9965 000 23749	100nF 10% 16V 0805
2002	9965 000 14069	100µF 20% 16V
2003	9965 000 17525	22pF 5% 50V
2004	9965 000 17525	22pF 5% 50V
2005	9965 000 23792	47nF 10% 16V 08
2006	9965 000 17508	470µF 20% 10V
2007	9965 000 14075	10µF 20% 50V
2123	9965 000 17528	1µF +80/-20% 16V 0805
2181	9965 000 17525	22pF 5% 50V
2182	9965 000 17527	330pF 5% 50V
2183	9965 000 17527	330pF 5% 50V
2201	9965 000 17687	4.7nF 10% 50V
2202	9965 000 17527	330pF 5% 50V
2202	9965 000 23739	820pF 5% 50V 0805
2203	9965 000 17529	470nF 10% 16V 0805
2205	9965 000 14075	10µF 20% 50V
2206	9965 000 17687	4.7nF 10% 50V
2206	9965 000 23837	33pF 50V 0805
2207	9965 000 23749	100nF 10% 16V 0805
2208	9965 000 23749	100nF 10% 16V 0805
2209	9965 000 23749	100nF 10% 16V 0805
2210	9965 000 23742	220nF 10% 16V 0805
2212	9965 000 23742	220nF 10% 16V 0805
2405	9965 000 17512	47µF 20% 160V
2408	9965 000 17516	0.56µF 5% 250V
2420	9965 000 23749	100nF 10% 16V 0805
2421	9965 000 23749	100nF 10% 16V 0805
2423	9965 000 17652	13nF 5% k
2423	9965 000 23824	15nF 5% 1.6kV
2424	9965 000 17514	470pF 10% 2kV
2424	9965 000 22813	10nF 10% 2kV
2426	9965 000 17522	1nF 50V 0805
2427	9965 000 23749	100nF 10% 16V 0805
2428	9965 000 23748	47µF 20% 16V
2429	9965 000 23742	220nF 10% 16V 0805
2441	9965 000 14080	33nF 5% 50V
2441	9965 000 17521	22nF 5% 63V
2444	9965 000 14599	470µF 20% 16V
2446	9965 000 14599	470µF 20% 16V
2447	9965 000 14921	10µF 20% 250V
2452	9965 000 17686	22nF +80%-20% 50V
2452	9965 000 23749	100nF 10% 16V 0805
2455	9965 000 14579	10µF 20% 16V
2457	9965 000 17562	470pF 10% 500V
2460	9965 000 23798	0.068µF 5% 100V
2461	9965 000 23799	10nF 5% 50V
2462	9965 000 23799	10nF 5% 50V
2463	9965 000 14076	47µF 20% 50V
2464	9965 000 23743	470pF 50V 0805
2465	9965 000 23797	10µF 20% 160V
2470	9965 000 14080	33nF 5% 50V
2473	9965 000 23743	470pF 50V 0805
2481	4822 126 13221	100pF 2% 63V
2482	9965 000 17528	1µF +80/-20% 16V 0805
2483	9965 000 23767	4.7µF +80/-20% 16V
2484	9965 000 23749	100nF 10% 16V 0805
2485	9965 000 17528	1µF +80/-20% 16V 0805
2486	9965 000 17687	4.7nF 10% 50V
2487	9965 000 23765	22nF 10% 50V
2488	9965 000 22940	100nF 5% 100V
2489	9965 000 17522	1nF 50V 0805
2490	9965 000 23767	4.7µF +80/-20% 16V
2491	9965 000 17508	470µF 20% 10V
2492	9965 000 23763	22µF 20% 50V
2493	9965 000 17508	470µF 20% 10V
2494	9965 000 13961	47µF 20% 16V
2496	9965 000 17522	1nF 50V 0805
2497	9965 000 17522	1nF 50V 0805
2500	9965 000 17565	220nF 20% 275V
2501	9965 000 17563	2.2nF 10% 1kV
2502	9965 000 17563	2.2nF 10% 1kV
2504	9965 000 15785	220µF 20% 200v
2515	9965 000 23777	1.5pF 20% 250V
2520	9965 000 17523	10nF +80%-20% 50V
2521	9965 000 14038	22µF 20% 50V
2522	9965 000 17522	1nF 50V 0805
2523	9965 000 14922	1.8nF 10% 2kV
2525	9965 000 23779	680pF 5% 50V 0805
2527	9965 000 23778	56pF 5% 50V
2528	9965 000 14038	22µF 20% 50V
2540	9965 000 17653	15nF 10% 50V 0805
2541	9965 000 17687	4.7nF 10% 50V
2542	9965 000 17530	470nF +80/-20% 16V
2543	9965 000 17522	1nF 50V 0805
2560	9965 000 15104	2.2nF 10% 50V
2561	4822 124 40196	220µF 20% 16V
2562	9965 000 23787	2.2nF 10%
2564	9965 000 23789	47µF 20 %160V
2580	9965 000 15182	47µF 20% 25V
2584	9965 000 23786	220pF 10% 1kV
2602	9965 000 23766	33pF 50V 0805
2603	9965 000 23766	33pF 50V 0805
2604	9965 000 14579	10µF 20% 16V
2605	9965 000 23749	100nF 10% 16V 0805
2607	9965 000 23764	0.1µF 10% 50V 0805
2608	9965 000 17528	1µF +80/-20% 16V 0805
2612	9965 000 14070	220µF 20% 16V
2615	9965 000 23739	820pF 5% 50V 0805
2616	9965 000 14579	10µF 20% 16V
2641	9965 000 17522	1nF 50V 0805
2642	9965 000 17522	1nF 50V 0805
2643	9965 000 17526	220pF 5% 50V
2691	9965 000 15805	100µF 20% 10V
2861	9965 000 17644	220nF +80/-20% 25V
2862	9965 000 23838	2.2µF 20% 16V
2864	9965 000 15087	2.2µF 20% 50V
2865	9965 000 15087	2.2µF 20% 50V
2866	9965 000 23838	2.2µF 20% 16V
2867	9965 000 23839	1.8nF 10% 50V
2868	9965 000 23836	150pF 5% 50V
2869	9965 000 17541	0.068µF 5% 63V
2870	9965 000 17541	0.068µF 5% 63V
2871	9965 000 23836	150pF 5% 50V
2872	9965 000 23839	1.8nF 10% 50V
2873	9965 000 23838	2.2µF 20% 16V
2874	9965 000 14036	100µF 20% 25V
2875	9965 000 14036	100µF 20% 25V
2876	9965 000 14039	4.7µF 20% 50V
2877	9965 000 14075	10µF 20% 50V
2878	9965 000 14037	1µF 20% 50V
2879	9965 000 17687	4.7nF 10% 50V
2880	9965 000 22456	22nF 10% 50V
2883	9965 000 14599	470µF 20% 16V
2884	9965 000 15087	2.2µF 20% 50V
2885	9965 000 15113	220nF 5% 50V
2886	9965 000 23749	100nF 10% 16V 0805
2891	9965 000 23749	100nF 10% 16V 0805
2903	9965 000 14037	1µF 20% 50V
2904	9965 000 17528	1µF +80/-20% 16V 0805
2904	9965 000 17530	470nF +80/-20% 16V
2906	9965 000 17530	470nF +80/-20% 16V
2908	9965 000 14039	4.7µF 20% 50V
2909	9965 000 14075	10µF 20% 50V
2950	9965 000 17567	1.5nF 10% 50V
2951	9965 000 23739	820pF 5% 50V 0805
2952	9965 000 23739	820pF 5% 50V 0805
2981	9965 000 14075	10µF 20% 50V
2982	9965 000 23743	470pF 50V 0805
2983	9965 000 14075	10µF 20% 50V
2984	9965 000 23743	470pF 50V 0805

⌐WW⌐

3001	4822 117 11139	1.5kΩ 1% 0.1W
3002	9965 000 17481	8.2kΩ 5% 0.1W
3003	4822 117 11373	100Ω 1% 0805
3004	4822 117 11373	100Ω 1% 0805
3005	9965 000 14049	100Ω 5% 0.16W
3181	4822 111 31025	75Ω 5% 0.16W
3182	9965 000 14049	100Ω 5% 0.16W
3183	9965 000 12485	150Ω 5% 0.16W
3184	9965 000 13180	47kΩ 5% 0.1W
3185	9965 000 12485	150Ω 5% 0.16W
3186	9965 000 13180	47kΩ 5% 0.1W
3201	4822 051 20392	2.9kΩ 5% 0.1W
3201	4822 117 12955	2.7kΩ 1% 0.1W 0805
3202	4822 117 11373	100Ω 1% 0805
3203	4822 051 20102	1kΩ 5% 0,1W
3204	9965 000 12623	82Ω 5% 0.16W
3205	9965 000 15050	270Ω 5% 0.16W
3206	4822 051 20102	1kΩ 5% 0,1W
3207	4822 051 20391	390Ω 5% 0.1W
3208	4822 053 10561	560Ω 5% 1W
3209	9965 000 17480	470Ω 5% 0.1W
3210	9965 000 14049	100Ω 5% 0.16W
3231	4822 051 20561	560Ω 5% 0.1W
3403	9965 000 23755	470Ω 5% 0.33W
3410	4822 051 20683	68kΩ 5% 0.1W
3422	9965 000 23746	330kΩ 0.25W
3423	9965 000 23752	33Ω 5% 0.5W
3424	4822 053 12339	33Ω 5% 3W
3425	9965 000 15442	330Ω 5% 1W
3426	9965 000 12593	47Ω 5% 0.16W
3428	9965 000 13958	68Ω 5% 0.17W
3430	4822 051 20102	1kΩ 5% 0,1W
3432	9965 000 17480	470Ω 5% 0.1W
3439	9965 000 23745	150kΩ 1% 0.5W
3440	9965 000 23753	36kΩ 1% 0.1W
3440	9965 000 23822	33kΩ 1% 0.1W
3441	9965 000 13180	47kΩ 5% 0.1W
3442	9965 000 15041	100k 5% 0.16W
3442	9965 000 23744	150kΩ 5% 0.17W
3443	9965 000 23756	4.7Ω 5% 0.33W
3443	9965 000 23825	1.8Ω 5% 0.33W
3444	9965 000 23757	3.9Ω 5% 0.33W
3444	9965 000 23825	1.8Ω 5% 0.33W
3445	9965 000 23759	1.8Ω 5% 0.5W
3446	9965 000 23754	1Ω 5% 0.33W
3447	4822 051 20154	150kΩ 5% 0.1W
3447	9965 000 23747	220kΩ 5% 0.1W
3448	9965 000 23754	1Ω 5% 0.33W
3449	9965 000 17647	27k 5% 0.16W
3450	9965 000 17647	27k 5% 0.16W
3451	4822 051 20684	680kΩ 5% 0.1W
3451	9965 000 17481	8.2kΩ 5% 0.1W
3452	9965 000 12626	1.0MΩ 5% 0.17W
3453	4822 117 10837	100kΩ 1% 0.1W
3454	9965 000 17505	10kΩ 5% 0.1W
3455	4822 117 11449	2.2kΩ 5% 0.1W 0805
3455	9965 000 17480	470Ω 5% 0.1W
3457	9965 000 23758	2.2mΩ 1% 0.1W
3459	9965 000 23744	150kΩ 5% 0.17W
3460	4822 117 10837	100kΩ 1% 0.1W
3460	9965 000 13180	47kΩ 5% 0.1W
3461	4822 117 11449	2.2kΩ 5% 0.1W 0805
3462	4822 117 11948	1MΩ 1% 0.1W
3463	4822 117 11449	2.2kΩ 5% 0.1W 0805
3464	9965 000 12515	2.2k 5% 0.16W
3465	4822 051 20102	1kΩ 5% 0,1W
3466	4822 051 20102	1kΩ 5% 0,1W
3468	9965 000 12592	330Ω 5% 0.16W
3470	9965 000 23754	1Ω 5% 0.33W
3471	9965 000 12549	220Ω 55 0.16W
3472	9965 000 12549	220Ω 55 0.16W
3473	9965 000 23796	4.7Ω 1% 0.5W
3473	9965 000 23827	2.7Ω 1% 0.5W
3474	9965 000 23796	4.7Ω 1% 0.5W
3474	9965 000 23826	3.3Ω 1% 0.5W
3475	9965 000 14050	10k 5% 0.16W
3476	9965 000 17481	8.2kΩ 5% 0.1W
3478	4822 116 82805	1Ω 5% 0.17W
3479	9965 000 23740	18Ω 5% 0.33W
3480	4822 051 20393	39kΩ 5% 0.1W
3481	4822 117 10965	18kΩ 1% 0.1W
3483	9965 000 12626	1.0MΩ 5% 0.17W
3485	9965 000 12519	1k 5% 0.16W
3486	9965 000 12519	1k 5% 0.16W
3487	4822 051 20333	33kΩ 5% 0.1W
3488	9965 000 15044	1.5k 5% 0.16W

3489	9965 000 17505	10kΩ 5% 0.1W
3490	4822 051 20332	2.3kΩ 5% 0.1W
3491	4822 111 31023	47k 5% 0.16W
3492	4822 117 10965	18kΩ 1% 0.1W
3493	9965 000 23740	18Ω 5% 0.33W
3495	9965 000 17636	33Ω 5% 0.17W
3497	9965 000 14056	390Ω 5% 0.17W
3498	4822 111 31023	47k 5% 0.16W
3499	4822 051 20273	27kΩ 5% 0.1W
3500	9965 000 23775	3.3mΩ 0.5W
3501	9965 000 23775	3.3mΩ 0.5W
3502	9965 000 15782	NTC 4.7Ω 18%
3503	9965 000 23776	10Ω 30%
3506	9965 000 23746	330kΩ 0.25W
3508	9965 000 23774	1.5mΩ 0.5W
3509	9965 000 17550	220Ω 10% 0.5W
3510	9965 000 23313	Surge absorber DSP-301N
3519	4822 111 31036	3.3k 5% 0.16W
3520	4822 051 20122	1.2kΩ 5% 0.1W
3522	4822 051 20334	330kΩ 5% 0.1W
3523	9965 000 23788	100Ω 5% 0.33W
3525	4822 051 20102	1kΩ 5% 0,1W
3526	9965 000 23785	0.15Ω 5% 1W
3527	9965 000 23788	100Ω 5% 0.33W
3528	9965 000 17505	10kΩ 5% 0.1W
3541	9965 000 17480	470Ω 5% 0.1W
3542	4822 117 11139	1.5kΩ 1% 0.1W
3543	9965 000 23773	82kΩ 1% 0.5W
3544	9965 000 23772	6.8kΩ 1% 0.5W
3545	4822 117 11449	2.2kΩ 5% 0.1W 0805
3547	4822 117 10837	100kΩ 1% 0.1W
3548	4822 116 83933	15kΩ 1% 0.1W
3549	9965 000 12549	220Ω 55 0.16W
3580	9965 000 13180	47kΩ 5% 0.1W
3581	4822 051 20569	56Ω 5% 0,1W
3601	4822 117 11449	2.2kΩ 5% 0.1W 0805
3602	4822 117 11449	2.2kΩ 5% 0.1W 0805
3603	9965 000 12515	2.2k 5% 0.16W
3604	9965 000 14049	100Ω 5% 0.16W
3605	9965 000 14049	100Ω 5% 0.16W
3606	9965 000 14050	10k 5% 0.16W
3607	4822 117 11373	100Ω 1% 0805
3618	9965 000 12519	1k 5% 0.16W
3619	9965 000 14049	100Ω 5% 0.16W
3620	9965 000 14049	100Ω 5% 0.16W
3621	9965 000 14049	100Ω 5% 0.16W
3624	9965 000 14050	10k 5% 0.16W
3634	9965 000 12519	1k 5% 0.16W
3641	9965 000 14049	100Ω 5% 0.16W
3642	4822 117 11373	100Ω 1% 0805
3643	4822 117 11373	100Ω 1% 0805
3644	4822 051 20472	4.7kΩ 5% 0.1W
3645	4822 117 11373	100Ω 1% 0805
3646	4822 051 20105	1MΩ 5% 0.1W
3681	4822 117 11454	820Ω 1% 0.1W
3682	4822 117 13629	120Ω 1% 0.1W 0805
3683	4822 051 20121	120Ω 5% 0.1W
3685	4822 117 13528	200Ω 1% 0.125W 0805
3686	4822 117 11452	430Ω 1% 0.1W
3687	4822 117 11449	2.2kΩ 5% 0.1W 0805
3688	4822 117 13528	200Ω 1% 0.125W 0805
3693	9965 000 12549	220Ω 55 0.16W
3694	4822 117 11145	4.7kΩ 1% 0.1W
3861	4822 117 10837	100kΩ 1% 0.1W
3862	4822 116 83933	15kΩ 1% 0.1W
3863	4822 051 20122	1.2kΩ 5% 0.1W
3864	4822 117 11373	100Ω 1% 0805
3865	9965 000 14049	100Ω 5% 0.16W
3866	9965 000 14049	100Ω 5% 0.16W
3867	4822 051 20332	2.3kΩ 5% 0.1W
3901	9965 000 12519	1k 5% 0.16W
3902	4822 051 20332	2.3kΩ 5% 0.1W
3903	4822 051 20332	2.3kΩ 5% 0.1W
3903	4822 051 20472	4.7kΩ 5% 0.1W
3904	4822 117 12955	2.7kΩ 1% 0.1W 0805
3904	9965 000 17505	10kΩ 5% 0.1W
3905	4822 051 20332	2.3kΩ 5% 0.1W
3906	9965 000 17505	10kΩ 5% 0.1W
3907	9965 000 17481	8.2kΩ 5% 0.1W
3911	4822 117 10837	100kΩ 1% 0.1W
3981	4822 117 11504	270Ω 1% 0.1W
3982	9965 000 15050	270Ω 5% 0.16W
4xxx	9965 000 17478	0Ω 5% 0.1W

5002	9965 000 23780	Choke coil 27µH 270kΩ
5003	9965 000 23793	Choke coil 0.22 µH 10%
5004	9965 000 23760	Bead LB3.5X1X9
5201	9965 000 23768	Choke coil 4.7uH 10%
5421	9965 000 23750	Transf. hor. drive
5441	9965 000 23751	Transf.JF0501-19255R line outp
5441	9965 000 23823	Transf.JF0501-19276R line outp
5482	9965 000 14082	Coil choke 10% 10uH
5502	9965 000 23781	Line filter
5509	9965 000 17576	Bead cord inductor
5520	9965 000 23782	Transf. conv. BCK-28-0414
5521	9965 000 17576	Bead cord inductor
5560	9965 000 17576	Bead cord inductor
5561	9965 000 23760	Bead LB3.5X1X9
5562	9965 000 23760	Bead LB3.5X1X9
5563	9965 000 23780	Choke coil 27µH 270kΩ
5601	9965 000 23769	Choke coil 5.6uH 10%
5602	9965 000 23769	Choke coil 5.6uH 10%
5603	9965 000 23769	Choke coil 5.6uH 10%
5604	9965 000 17576	Bead cord inductor
5861	9965 000 14082	Coil choke 10% 10uH
5862	9965 000 17576	Bead cord inductor

6001	9965 000 15716	Zener diode 33V 5% 0.5W
6181	4822 130 34278	BZX79-B6V8
6422	9335 214 80133	BYV97G
6423	9340 255 30135	BAS216
6426	9340 255 30135	BAS216
6444	4822 130 80931	EGP20D
6444	9965 000 09663	SR360 3A 60V
6445	9340 255 30135	BAS216
6446	3141 018 51230	FR104
6447	3141 018 51230	FR104
6451	9340 255 30135	BAS216
6452	9340 255 30135	BAS216
6453	4822 130 34142	BZX79-B33
6460	9340 255 30135	BAS216
6461	3141 018 51230	FR104
6462	3141 018 51230	FR104
6463	3141 018 51230	FR104
6464	9340 255 30135	BAS216
6481	9340 255 30135	BAS216
6491	9965 000 23761	BAV70LT1
6492	3198 020 55680	BZX384-C5V6
6500	9965 000 15164	RL255
6501	9965 000 15164	RL255
6502	9965 000 15164	RL255
6503	9965 000 15164	RL255
6520	4822 130 41601	BYV95A
6522	4822 130 41601	BYV95A
6540	4822 130 34167	BZX79-B6V2
6541	4822 130 30862	BZX79-B9V1
6560	9965 000 09663	SR360 3A 60V
6561	9322 192 67682	BYW76-PK1
6562	9322 192 67682	BYW76-PK1
6580	4822 130 30621	1N4148
6624	9340 255 30135	BAS216
6625	4822 130 34382	BZX79-B8V2
6625	4822 130 61219	BZX79-B10
6626	9340 255 30135	BAS216
6627	9340 255 30135	BAS216
6628	9340 255 30135	BAS216
6681	9340 255 30135	BAS216
6692	9965 000 23741	ISOP348VI1B
6908	9965 000 23738	BZX384-C2V7
6909	4822 130 30621	1N4148

7200	9352 758 58112	L03SUM1-1.1 (Mono)
7200	9352 758 57112	L03SUN1-1.1 (Stereo)
7201	5322 130 60159	BC846B
7202	5322 130 60159	BC846B
7421	9322 183 16687	BUL312FP
7422	4822 130 42804	BC817-25
7423	5322 130 60845	BC807-25
7440	9965 000 22888	BF423
7451	4822 130 60373	BC856B
7461	4822 130 60373	BC856B
7462	4822 130 60373	BC856B
7463	4822 130 44461	BC546B
7464	4822 130 41109	BD135-16
7465	9965 000 23795	BD136
7466	5322 130 60159	BC846B
7491	5322 130 60159	BC846B
7493	4822 209 16978	LF33CV
7494	4822 130 40981	BC337-25
7496	4822 130 41109	BD135-16
7515	9965 000 22899	PS2561L1-1-V(WF)
7520	9352 720 43118	TEA1506T/N1
7521	9322 194 20687	STP5NK50ZFP
7523	4822 130 60373	BC856B
7540	4822 130 40959	BC547B
7541	4822 130 11155	PDTC114ET
7580	5322 130 60159	BC846B
7601	3198 010 44010	PDTA114ET
7641	9965 000 22895	M24C16
7861	9965 000 23835	TDA9853H
7901	9322 181 41682	AN7522N
7902	9322 181 42682	AN7523N

CRT panel [B]

Various

1300	9965 000 17689	Connector
1301	9965 000 23804	Soc. CRT
1302	9965 000 23828	Soc. CRT

2300	9965 000 17527	330pF 5% 50V
2301	9965 000 23806	390pF 5% 50V
2302	9965 000 23806	390pF 5% 50V
2303	9965 000 22813	10nF 10% 2kV
2304	9965 000 23805	220nF5% 250V

3300	9965 000 23309	18kΩ 5% 3W
3301	9965 000 17470	1.5kΩ 10% 0.5W
3303	4822 117 13577	330Ω 1% 1.25W 0805
3304	9965 000 23309	18kΩ 5% 3W
3305	9965 000 17470	1.5kΩ 10% 0.5W
3307	4822 117 13577	330Ω 1% 1.25W 0805
3308	9965 000 23309	18kΩ 5% 3W
3309	9965 000 17470	1.5kΩ 10% 0.5W
3311	4822 051 20391	390Ω 5% 0.1W
3311	4822 117 13577	330Ω 1% 1.25W 0805
3313	9965 000 23803	68Ω 5% 0.33W
3318	9965 000 23802	220Ω 5% 0.33W
3319	9965 000 17470	1.5kΩ 10% 0.5W
4300	9965 000 17478	0Ω 5% 0.1W
4301	9965 000 17478	0Ω 5% 0.1W
4302	9965 000 17478	0Ω 5% 0.1W
4303	9965 000 17478	0Ω 5% 0.1W
4304	9965 000 17478	0Ω 5% 0.1W
4305	9965 000 17478	0Ω 5% 0.1W
4306	9965 000 17478	0Ω 5% 0.1W

6301	9340 255 30135	BAS216
6307	9340 255 30135	BAS216
6318	4822 130 10837	UDZS8.2B

7308	4822 130 41782	BF422
7310	4822 130 41782	BF422
7312	4822 130 41782	BF422
7313	4822 130 41782	BF422
7314	9965 000 22888	BF423
7315	4822 130 41782	BF422
7316	9965 000 22888	BF423
7317	4822 130 41782	BF422
7318	9965 000 22888	BF423

11. Revision List

First release.